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THE PHYSICAL GEOGRAPHY OF NEW YORK STATE.

PART I.—GENERAL PHYSIOGRAPHIC FEATURES.*

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* In later pages references are made to special discussions of individual features. General descriptions are found in the following: Eaton, Geological and Agricultural Survey of the District adjoining the Erie Canal in the State of New York, Albany, 1824.

Henry, Trans. Albany Inst. I, 1830, 87–112.

Natural History of New York, Geology, Part I, Mather; Part II, Emmons; Part III, Vanuxem; Part IV, Hall, 1842–3.

Emmons, Natural History of New York, Agriculture; Vols. I–IV, 1846–1851.

New York State Museum, Report 47, 1894, Albany.

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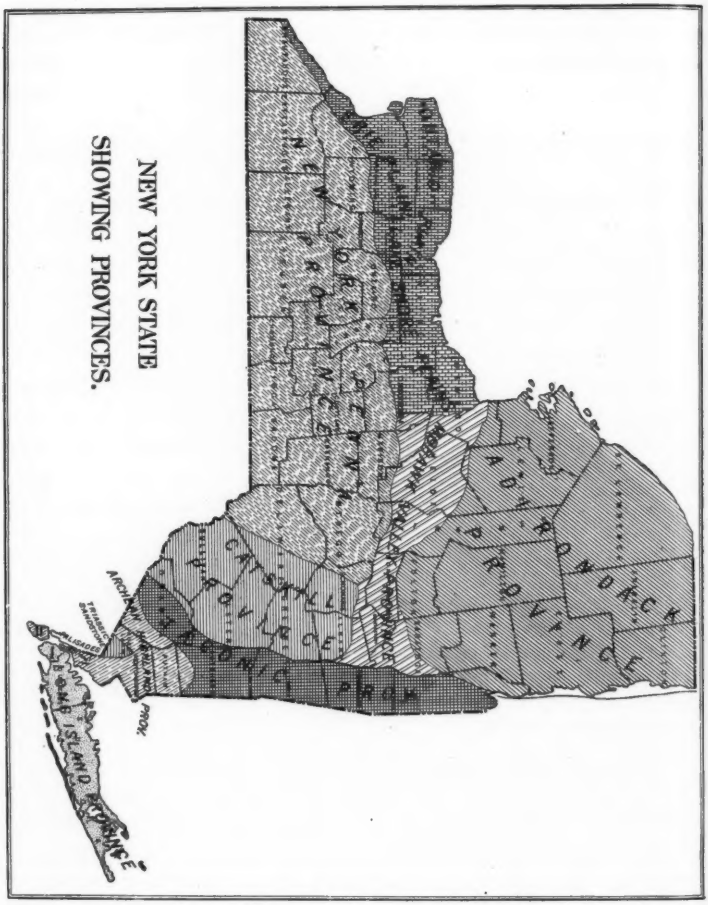
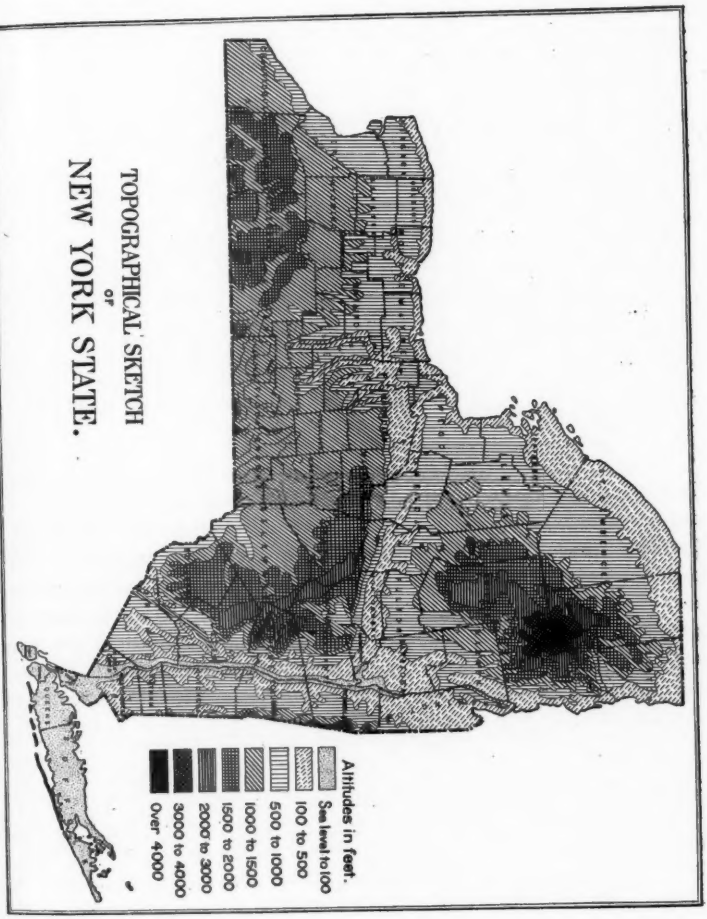

NEW YORK STATE
SHOWING PROVINCES.
ADIRONDACK PROVINCE
CATSKILL PROVINCE
ALLEGHANY PROVINCE
NEW YORK PROVINCE
CHAMPLAIN PROVINCE
ONTARIO PROVINCE
LONG ISLAND PROVINCE
BASED UPON THE WEATHER BUREAU MAP.


TOPOGRAPHICAL SKETCH
OF
NEW YORK STATE.
BASED UPON THE WEATHER BUREAU MAP.
Altitudes in feet.
Sea level to 100
100 to 500
500 to 1000
1000 to 1500
1500 to 2000
2000 to 3000
3000 to 4000
Over 4000

Physiographic Provinces.

General Division.—On its northern side the State of New York is very naturally bounded for the greater part of its distance; but nearly everywhere else the boundaries are purely artificial. In consequence of this, most of the physiographic provinces of the State are merely portions of larger areas which extend into it from the neighboring States. Viewed broadly, and excluding the New England border, there are two highland areas and one branching area of lowlands. If the sea should rise only a few hundred feet, it would extend up the Hudson valley and across the divide into the basin of Lake Champlain, thence into the St. Lawrence and Lake Ontario. At the same time, it would reach up the Mohawk and meet the waters of Lake Ontario, passing across the divide at Rome. So the Adirondacks would become an island, separated from the Green Mountains of Vermont by a narrow channel, from the Highlands of Canada by a broad strait, and from the Catskills and the plateau of central and southern New York by a strait of intermediate width. As a result of this change the Long Island province would be entirely submerged in the sea.

Long Island Province.—Examining the topography of the State in a little more detail, we find these highland and lowland areas capable of considerable subdivision. There is first the sandy lowland of Long Island, barely separated from the mainland, yet quite distinct from it in its general features of outline and in its rock structure. The highest elevation is about 380 feet, and the plains average only about 70 feet above sea level.* It is really a northward extension of the coastal province of New Jersey, but its surface is considerably modified by deposits of glacial drift.†

Gneissic Highland Province.—Passing to the mainland, there commences a province of complex structure, and one in which, in the main and most typical part of the province, the rocks for the most part are very much folded and disturbed metamorphic strata of ancient date. These rocks are really an extension of the Highlands of New Jersey,‡ which reach across the southern angle of New York, extend northward and enter Connecticut. Besides

* Am. Journ. Sci. XIII, 1877, 235.

† Upham, Am. Journ. Sci. XVIII, 1879, 81–92; 197–209; Mather, Geol. of New York, Part I, 1843, p. 161; 248–278.

‡ Chiefly described in New Jersey Geological Survey Reports. See also Pierce, Am. Journ. Sci. II, 1820, 181–199; same V, 1822, 26–33; Eaton, same V, 1822, 231–235; Shepard, same XXI, 1832, 321–334.

these Archean gneisses, there is some sandstone * and a black diabase or trap, which forms the Palisades, † besides extensive layers of limestone, gneiss and schist, which extend across the region occupied by the City of New York. ‡ This whole series of strata is intricately associated.

Excepting at the very seashore line, the province is a moderate highland, with rather rough topography and with hills rising in some places to an elevation of 1,000 or 1,200 feet above sea level. Where there is limestone or sandstone in this area, there is usually a lowland, while highlands occur wherever the hard gneiss comes to the surface not immediately at the seashore. This is extremely well illustrated in Rockland County, where the gneissic Ramapo Mountains are faced at their south-eastern base by a lowland, a somewhat rolling plain, which, however, is bounded on its eastern margin by another highland where the trap of the Palisades rises close by the Hudson River. At many points along the eastern boundary of this highland region the Ramapo Mountains rise to a height of 1,100 or 1,200 feet above sea level, while the average elevation of the hills on the sandstone plain at its base is not more than one-half this; but the highlands of the Palisades in some places rise to 700 or 800 feet above the sea.

It would be possible to subdivide this second province; and indeed this would be necessary if we were to extend this examination of the surface into minute details. There are: (1). The low hills and highlands of the immediate coast, including all of New York County and a part of Westchester County. There is then: (2) the Palisade range of trap rock, and (3) the small angle of Triassic sandstone which extends from New Jersey into New York as a wedge-shaped area of undulating plain—a low hilly province in the apex of the angle between the Palisade and the real gneissic highlands. West of this is: (4) the gneissic highland proper in western Rockland, eastern Orange and a large part of Putnam Counties. This portion of the province forms the western member of the general highland area. The Hudson River crosses it,

* Mather, Geology of New York, Part I, 1843, 285–294; Russell, Annals, N. Y. Acad. Sci. I, 1879, 220–254; Russell, Bull. 85 U. S. Geol. Survey, 1892.

† Mather, Geology of New York, Part I, 1843, 278–85; 465–487; 534–541. Wurtz, Proc. New York Lyceum Nat. Hist., I, 1870, 99–105.

Darton, Bulletin 67, U. S. Geol. Survey, 1890.

‡ Mather, Geology of New York, Part I, 1843, 441–464; 525–534; Gale, in same, 581–604; Britton, Annals N. Y. Acad. Sci., II, 1882, 161–184; Transactions of same, VI, 1886, 12–18. See also references for Taconic Province (p. 104). Kemp, Trans. New York Acad. Sci., VII, 1887, 49–64.

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cutting the strata diagonally and so trenching the highland area throughout its width. The axes of the folds, which prevail in this complex region, are almost uniformly northeast and southwest and the folding has been extremely complex.

*Taconic Province.**—West of this gneissic highland is an area of folded rock, which, compared with the gneissic highland in the southern part, is itself a lowland. It extends as a broad valley northward from Pennsylvania, across New Jersey and into Orange County, New York, then, crossing the Hudson, it skirts the boundaries and extends into the States of Connecticut, Massachusetts and Vermont. The rocks are mostly shales, slates, schists and limestones; but in the northern portion some of the strata are durable quartzite and even gneiss. While the topography is that of a valley in the southern portion, this province in the northern part becomes transformed into a region of highlands, and indeed of real mountains. This is true of the Taconic range, on the boundary between Massachusetts and Rensselaer County, which rises to an elevation of more than 2,800 feet above sea level. This same range extends along the axis of the Green Mountains, and passes across the Canadian line at the boundary with Vermont.

Throughout its entire extent the rocks of this province are folded, and the topography hilly; but in the southern part it is a gently undulating, broad valley between two highlands, because its rocks are softer and more easily denuded than the bounding strata. Towards the northeast, near the Massachusetts and Vermont boundaries, metamorphism has altered these strata until they are harder than the surrounding rocks; and hence they form true mountains, sloping on the one side toward the valley of the Hudson and

* The Taconic area has served as the basis for an extremely prolonged controversy. The reports of the Geological Surveys of Vermont, Massachusetts and Connecticut contain facts upon this province. Besides these, reference may be made to the following: Dewey, Am. Journ. Sci. II, 1820, 246–249. Barnes, Am. Journ. Sci. V, 1822, 8–21. Dewey, Am. Journ. Sci. VIII, 1824, 1–60; 240–244. Emmons, Geology of New York, Part II, 1842, 135–164. Mather, Geology of New York, Part I, 1843, 366–438. Dana, Am. Journ. Science, XIV, 1877, 37–48; 132–140; 202–7; 257–64; XVII, 1879, 375–388; XVIII, 1879, 61–64; XIX, 1880, 153–155 (contains a Bibliography); 191–200; 236–237; XX, 1880, 21–32; 194–220; 359–375; 450–456; XXI, 1881, 425–443; XXII, 1881, 103–119; 313–315; 327–335. Dwight, Am. Journal Science, XVII, 1879, 389–92; XIX, 1880, 50–54; 451–453; XXI, 1881, 78–79. Dale, Am. Journal Science, XVII, 1879, 57–59. Ford, Am. Journ. Sci. XIX, 1880, 225–226. Dale, Thirteenth Annl. Rept. U. S. Geol. Survey, 1893, 291–340. Pumpelly, Wolff and Dale, Monograph XXIII, U. S. Geological Survey, 1894, Washington, D. C.

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on the other toward the Connecticut. After passing the latitude of the boundary between Vermont and Massachusetts, this province is almost entirely within the State of Vermont; for the Lake Champlain depression marks the western boundary. From near Catskill, northward to Glen's Falls, the Hudson may be considered as the approximate western boundary of this area. South of Catskill the Hudson turns away from the boundary, enters the area and crosses it, then enters and extends across the gneissic highlands. While, especially in the north, the rocks in the Taconic area are considerably metamorphosed, sometimes even past recognition of their original condition, in the south they become less and less changed; and there (as well as in a few places to the north) we are able to see that they are members of the Cambrian and Lower Silurian periods. On page 118 it is shown that the rocks of this area were all folded at one time; and hence the area may be properly separated from the complex gneissic province.*

Catskill Province.†—The folded rocks of the Appalachians enter this State in western Orange and eastern Sullivan Counties; and in this region the folds have determined a series of ridges which make this part of the State a truly mountainous section, notably in Shawangunk Mountain, where a tilted conglomerate rock caps the ridge.‡ West and north of this the strata are less disturbed, and are for the most part in a horizontal position.

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* Some may question the value of a separation of these eastern folded sections into two provinces; and, so far as New York is concerned, the division would not be warranted. Really the folding of the Taconic rocks involved the eastern gneissic highlands also, and the rocks of Westchester County are mostly of this age. The true Taconic Province therefore divides in Putnam County, one portion passing southwards into Westchester County (see articles by Dana referred to on p. 104. See also Prosser, Trans. New York Acad. Sci. XI, 1892, 132–149). The place of division is the older Archean and younger sedimentary areas. One might therefore speak of the whole eastern margin of the State, exclusive of Long Island, as the Taconic area, which extends eastward at least as far as the Connecticut. This could then be subdivided into (1) the eastern, Westchester County Taconic, (2) the Palisade range, (3) the Triassic sandstone, (4) the Archean Highlands, and (5) the main Taconic area, mountainous in the north and lowland in the south.

† Dwight, Am. Journ. Sci. II, 1820, 11–29. Barton, Am. Journ. Sci. IV, 1822, 249–251. Pierce, Am. Journ. Sci. VI, 1823, 86–97. Vanuxem, Geology of New York, Part III, 1842, 186–194. Mather, Geology of New York, Part I, 1843, 299–316. Hall, Proc. Am. Assoc. Adv. Sci. XXIV, 1875, Part 2, 80–84. Guyot, Am. Journ. Sci. XIX, 1880, 429–451. Julien, Trans. New York Acad. Sci. I, 1881, 24–27; Newberry, same, 28–31. Darton, Report 47, New York State Museum, 1894, 485–566.

‡ See Mather, Geology of New York, 1st District, 1843, pp. 355–7. Darton, Nat. Geog. Mag. VI, 1894, 23–34; New York State Museum Report 47, 1894, 485–566.

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Being in this place made of durable sandstones and conglomerate, and being very much carved by denudation, this plateau region has the appearance of real mountains; and some of the peaks are more than 3,500 feet, and one even 4,205 feet above the sea level. In the southeastern part of the province, where the rocks are really folded, the hard strata stand up in the form of mountain ridges. In this province the rocks are sandstones, conglomerates, shales and limestones of the Devonian age; and where there are folds* they are essentially like those of the plateau west of this province, excepting that they are more intense. Both in the north and in the west, they gradually disappear, and the mountainous region in both of these directions is gradually replaced by a plateau. The western boundary of the Catskill province is not easily drawn with definiteness; but the eastern boundary is marked by a quite continuous highland overlooking the lower region of the Taconic province, and the north by a strongly developed escarpment, the Helderberg (see pages 107, 124).

This province might also be subdivided. It is the only truly mountainous portion of the State made out of rocks later than the lower Silurian. It might be divided into (1) the folded, southeastern portion and (2) the deeply dissected Catskill plateau area.

New York-Pennsylvania Plateau Province.†—West of this, and occupying fully one-third of the State, is a great plateau region, often deeply dissected by numerous broad river valleys. It is made entirely of Devonian rocks, mostly upper Devonian shales and sandstones, in which, however, there are some strata of limestone. The strata of this province are in a nearly horizontal position, in this respect differing from the previous province, with the exception of a part of the Catskills.‡ This fact of the horizontality of the rocks determines the extensive plateau character of the province, a feature which extends southward, across the Pennsylvania line, along the western base of the Appalachians. Throughout the New York section of the plateau, the hill tops quite commonly rise to elevations of 1,500 to 2,000 feet, and the average elevation above the sea level cannot be less than 1,000–1,200 feet. From the valleys this does not resemble a plateau, but rather a mountainous

* Hall, Am. Assoc. Adv. Sci. XXIV, 1875, Part 2, 80–84.

† Mather, Geology of New York, Part I, 1843, 317–365; Hall, same, Part II, 1843. Also Williams, Bull. 80 U. S. Geol. Survey, Washington, 1891.

‡ There are some gentle folds and faults. See Hall, Geology of New York, Part IV, 1843, 163; 213; Williams, Proc. Am. Assoc. Adv. Sci. XXXI, 1882, 412. Some of these undulations may be due to removal of beds of salt from beneath.

country; for the hills often rise to heights of 1,000–1,200 feet above the low valleys. Upon the tops of the hills one is able to see that this is really a plateau region very much cut by stream action, and carved by denudation, into a maze of hills, many of which are capped by the harder layers of nearly horizontal rocks.

Considered as one great dissected plateau, its surface undulates somewhat. Where the branches of the Susquehanna head against the headwaters of the Finger Lake streams, the plateau level is somewhat depressed.* It sags in the middle, being higher near the western base of the Catskills and lower in the Finger Lake region; then, rising again, it reaches a high elevation in Cattaraugus County, in western New York. Beyond this, in Chautauqua County, and westward in Pennsylvania, the plateau level again descends. Excepting near the Catskills, the highest portions of this plateau are in Cattaraugus and Allegany Counties in New York, and the adjoining counties of McKean and Potter in Pennsylvania.

On its northern face the plateau ends in an escarpment, which, though irregular and somewhat serrated, is commonly quite pronounced. Its position in the east is determined by the hard Helderberg limestone;† but in the extreme west it is determined by the two sets of shales, the upper and more durable ones and the lower fragile beds. Along the Erie shore, near the boundary between New York and Pennsylvania, the escarpment is about two or three miles from the lake; but going toward the east the escarpment recedes from the lake. In some cases it is very abrupt, and in Chautauqua County, it ascends to a height of 500 feet in a very short distance. The escarpment is less distinct in Erie County, but becomes more and more pronounced toward the east, and in Seneca and Cayuga Counties, it is a distinct escarpment, while east of this it becomes sufficiently high to form the Helderberg Mountains. Therefore, for the greater part of the distance, the northern boundary of the Catskill and Plateau provinces is a single deposit of limestone, which in some places rises 1,000 feet above the plain below.

Lake Shore Plains Province.‡—At the base of the escarpment, north of the plateau, there is always found one or more plains. In the west, on the Erie shore, the escarpment is bounded at its base

* See Lincoln, Am. Journ. Sci. XLIV, 1892, 290.

† Vanuxem, Geology of New York, Part III, 1842, 24; Darton, Report 47, New York State Museum, 1894, 394–396; 427–428.

‡ Hayes, Am. Journ. Sci. XXXI, 1837, 241–247; Vanuxem, Geology of New York, Part III, 1842, various pages; Hall, Geology of New York, Part IV, 1843, various pages.

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by a very narrow strip of plain, which gradually descends below the lake level. This plain widens toward the east, extending from the escarpment south of Buffalo to Lewiston and Lockport. The Niagara River, from Lake Erie to the Falls, crosses on the surface of this plain, then, dropping over the Falls, the river courses along in a gorge which has been cut into the plain.* Here and elsewhere we find that the strata are horizontal.† This plain crosses the Niagara River into the Province of Ontario,‡ and indeed extends beneath the waters of Lake Erie; for the bottom of this lake is really only a part of this plain.

Along the western shore of Lake Ontario, the plain just described is terminated on the northern margin by a rather abrupt escarpment, sometimes two or three hundred feet in height. This has its position determined by the very durable stratum of Niagara limestone, upon which the Falls are now situated, and by which their height and position are determined. In the east this escarpment gradually disappears and the two plains merge into one. This province may best be seen from the heights of Queenstown and Lewiston (called "The Mountain") on the Niagara River. There, stretching eastward toward Lockport, and westward into the Province of Ontario, is the Niagara escarpment; south of this, toward Buffalo, is the nearly level upland plain, the Erie plain; and northward, stretching from the very base of the bluff, is another remarkably level plain, which, extending along the shores of Ontario, may be called the Ontario plain. Its width varies from 4 to 9 miles. Beyond this, to the north, the level descends rapidly beneath the lake waters, and ten miles from the shore, the depth is 500–600 feet. In the east these plains become more hilly, and as a distinctive province, it disappears at about the longitude of the eastern end of Lake Ontario. Northward from this the plains extend into a series of hills which face the western base of the Adirondacks; and eastward they extend into the valley of the Mohawk, which is made the next province.

Mohawk Valley Province.§—East of Oneida Lake and Rome, there is a good-sized valley between the Adirondack Mountains on the north and the Plateau and Catskill Provinces on the south. It

* For a geological section in well-borings in this plain, see Ashburner, American Inst. Mining Eng., VII., 1888–89, 398–406.

† In a few places local folding is detected. See Hall, Geology of New York, Part IV, 1843, 295–298; Gilbert, Proc. Am. Assoc. Adv. Science, XL, 1891, 249–250.

‡ See Hunt, Am. Journ. Sci. XLVI, 1868, 355–362.

§ Vanuxem, Geology of New York, Part III, 1842, 20–21; 203–211. Darton, Report 47, New York State Museum, 1894, 603–623.

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is a broad, well-developed valley, irregular and hilly, and cut out of shales and limestones for the most part, though in one or two places the river has cut down into gneiss. While commonly horizontal, the rocks of this district are somewhat disturbed in places, particularly on the northern boundary, where they merge into the Adirondack Province. It is in such places, as at Little Falls, that the river, cutting into an uplifted portion, has reached down to the gneiss which probably underlies the entire valley as a subterranean continuation of the Adirondack region.

This province is the least characteristic of all that are named. Its boundaries are often indistinct, merging imperceptibly into the neighboring provinces; but there are parts of the valley which are distinctly separated from either of the bounding areas; and hence, for the sake of defining the topographical features, it may be classed as a separate province, although with the distinct understanding that it is not equal in value to some of the other divisions. On the east the Hudson River forms the natural boundary, and on the south, the escarpment.

*Adirondack Province.**—This, which is nearly as large as the Plateau Province, is second in size of the several divisions proposed. It is a nearly circular area of metamorphic and igneous rocks, mainly gneisses, granites, gabbros, norites and other plutonic or very much metamorphosed rocks. The area of metamorphic rocks is skirted by a collar of sedimentary strata of Lower Silurian and Cambrian age, which, though not so much metamorphosed, nor so greatly disturbed in position, are nevertheless to be considered a part of the Adirondack Province. In this area is then included the hilly, though lower land bordering the St. Lawrence and the western base of the Adirondacks along the shore of Ontario, as well as the hilly section on the southern boundary and along the shores of Lakes George and Champlain. The central and typical part of the province consists of a series of grand mountain masses, usually with flowing outlines and rising, in several

*Steele, Am. Journ. Sci. IX, 1825, 1–4. Finch, Am. Journ. Sci. XIX, 1831, 220–228. Redfield, Am. Journ. Sci. XXXIII, 1838, 301–323. Emmons, Geology of New York, Part II, 1842, various pages. Vanuxem, Geology of New York, Part III, 1842, various pages. Guyot, Am. Journ. Sci. XXXI, 1861, 157–187. Kemp, Trans. New York Acad. Sci. XII, 1892, 19–24 (Bibliography). Van Hise, Bulletin 86, U. S. Geol. Survey, 1892. Smyth, Trans. New York Acad. Sci. XII, 1892, 97–108. Kemp, Report 47, New York State Museum, 1894, 625–666; Cushing, 667–683; Smyth, 685–709.

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places, to a height of over 5,000 feet, while Mt. Marcy,* the highest peak, reaches an elevation of 5,379 feet above sea level. The eastern central portion is a central divide region, from which the streams radiate outward in all directions. In their course they are often very much disturbed by glacial deposits, and hence lakes are extremely abundant in these mountains.†

Summary Statement of Geographic Provinces.—Thus New York may be divided into eight provinces, every one of which except the last two, is only partially in this State. These are:

(1) The Long Island area, which is the northeastward continuation of the Tertiary and Cretaceous plains of New Jersey, and is composed of soft rocks covered by thick deposits of glacial drift. (2) The Gneissic Highland Province, which typically is made of highly metamorphosed rocks, folded into complex positions and with a general north-east and south-west strike. This may be subdivided into (*a*), the low hilly coastal portion; (*b*) the Palisade range; (*c*) the Triassic sandstone plains; (*d*) the true Gneissic Highlands, each of which extends from New Jersey into New York, while the main Gneissic Highland area passes north-eastward into New England. East of this is (3) the Taconic Province, a region of soft shales, slates, schists and limestones forming a valley in the southern part, but rising in the form of true mountains in the northern more highly metamorphosed part. This province also crosses the southern part of the State, entering it from New Jersey and passing into Connecticut, Massachusetts and Vermont.

West of this is (4) the Catskill Province, which is the northeastward extension of the Appalachian folds and the high Appalachian plateau on the western base of these mountains. While in some places the rocks are tilted, in others they are nearly horizontal, in each case being sandstones, conglomerates, limestones and shales. This province is bounded on the north by the Mohawk Valley area and on the west by (5) the New York and Pennsylvania Plateau Province, into which it gradually and imperceptibly merges. In the plateau region the rocks are all Devonian, and mostly upper Devonian, while their position is horizontal or nearly so. This is faced on the north by an escarpment, at the base of which lies the (6) Lake Shore Plain Province, in which the rocks are also horizontal; but, instead of being a deeply dissected

* See Emmons, Geology of New York, Part II, 1842, 218.
Colvin, Trans. Albany Inst. IX, 1879, 11–26.

† Emmons, Geology of New York, Part II, 1842, 171, 213–214, 415–416, 422–427.

plateau, they are in the condition of a remarkably level plain, rising to no great height above the surface of the lakes. In the west this province is double, consisting really of two plains separated by an escarpment; but in the east it becomes less like a plain, where the plains of the two levels are joined as one by the disappearance of the escarpment. This then becomes more and more hilly toward the east and finally disappears in (7) the Mohawk Valley Province, which is a hilly valley region, set between the Catskills and the great Plateau Province on the one side and (8) the Adirondack Province on the other. This latter province is the most mountainous and the highest portion of the State. It may be fairly considered to be entirely within the State, although a very small part of its northern border really extends into Canada, across the east and west portion of the New York-Canada line.

The most typical provinces are the Adirondack and the Plateau areas. Omitting Long Island, one might with simplicity divide the State into but four provinces: (1) the Eastern folded region, extending from the Sound to the base of the Catskills; (2) the New York-Pennsylvania Plateau Province, including the Catskills proper; (3) the Lake Shore Plains; (4) the Adirondacks, using the Mohawk River as a boundary line between the second and fourth provinces.

We then have two areas of folded and contorted rocks (1 and 4), making considerably more than one-third of the State, and two areas (2 and 3) of nearly horizontal strata. In the folded parts the scenery is beautiful, the rock structure complex and the topography quite irregular, particularly in the Adirondack portion. In the two areas of nearly horizontal strata, the scenery is usually less varied, though sometimes quite mountainous, notably in the Catskills and in Cattaraugus County. With decrease in ruggedness, the value of the land for agricultural purposes increases; and so the best of the agricultural land is situated on the plateaus and plains, particularly in the lower and more level lands near the lakes.

Drainage of the State.

Lakes.—The drainage of the State is very much interrupted by lakes, some of which present very interesting and even remarkable features. The lakes vary in size from Ontario, whose greatest length is over 180 miles with a width of 50 miles, to tiny ponds; and they vary in depth from mere shallow pools to Ontario, which in one place reaches a depth of 491 feet below sea level.* There are

* Being 738 feet deep and the surface being 247 feet above sea level.

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various types of lakes, but the prevailing feature throughout the State is the linear form, so typically illustrated in the group of Finger Lakes* which occupy the central depressed portion of the great Plateau Province, though not less so in Lakes Chautauqua, George, Champlain, and many of the Adirondack lakes. For the most part these lakes are plainly river valleys in which water has been made to collect because of their local transformation to basins.

While the lakes of the State are well scattered over its entire area, they are, excluding Lakes Erie and Ontario, bunched with especial abundance in three parts of the State, namely, (1) the Finger Lake region of the Central Plateau, (2) the Adirondacks and (3) the mountainous and hilly southeastern part of the State, including the Catskills. In these areas, and particularly in the Adirondacks, lakes are present in great numbers. Among the Adirondacks alone, there are many hundreds of lakes, great and small, besides a great number that have been filled and changed to swamps and meadows.

The St. Lawrence. — The water that falls within the boundaries of New York passes outwards in all directions.† Not far from one-half of the State, and more than one-half of the Adirondacks, is drained through the St. Lawrence River. The divide between the St. Lawrence and southern drainage passes irregularly east and west from the northeastern part through the middle of the State, passing out of it in only one place, namely in the middle western portion, where the Genesee rises in Pennsylvania and flows northward entirely across the State, entering Lake Ontario. The part of the State that drains into the St. Lawrence system sends its waters to that river through numerous streams, most of which are very small. There are many hundreds of these that enter the Great Lakes or Lake Champlain or the St. Lawrence directly. The only two that are of good size are the Genesee, which rises in Pennsylvania, and flows northward, entering Ontario near Rochester, and the Oswego, which carries the waters of the Finger Lakes of central New York. The divide between the St. Lawrence and the southern drainage area is very irregular, being sometimes far from the St. Lawrence or from the Lakes; but in one place, in Chautauqua

* Vanuxem, Geology of New York, Part III, 1842, 237–242. Hall, Same, Part IV, 1843, 321, 405–408. Lincoln, Am. Journ. Sci. XLIV, 1892, 290–301. Brigham, Bull., Am. Geograph. Soc. XXV, 1893, 16. Tarr, Bull. Geol. Soc. Am. V, 1894, 339–356.

† Ballou, Am. Nat. XIV, 1880, 139–140.

County, in western New York, it is within sight of Lake Erie and at a distance of not more than ten miles from it.

Not only are the tributaries of the St. Lawrence system fre quently interrupted by lakes, but the main portion of this river has the same features even more markedly developed. The main valley is a series of lakes, the Great Lakes, of which two, Erie and Ontario, are partly within the boundaries of New York. In the case of Ontario the valley is made into a lake for a distance of more than 180 miles, with an average breadth of not far from 40 miles. Connecting Lakes Erie and Ontario is the Niagara River with its wonderful falls and gorge. At the other end of Ontario, the waters emerge through a region almost as remarkable as the gorge through which they enter it. The lake gradually merges into a river, its channel being clogged and dotted by hundreds of islands. The outlet of Ontario is at first a great bay, gradually becoming a river only after passing over a distance of many miles, dividing and ramifying between the Thousand Islands.*

The Hudson.—Next in area is the Hudson drainage, including its single great tributary, the Mohawk, which enters from the west. The eastern boundary of this river system is very nearly the boundary between New York and New England, now entering these border States, again entering New York. A considerable part of the Catskills and the Adirondacks are drained into the Hudson. This is the single large stream which is really a New York river. Unlike any other, it rises in the State, flows entirely within its area and enters the sea within the State boundaries. With the exception of a very little water received from the bordering States of New Jersey, Connecticut, Massachusetts and Vermont, the Hudson obtains all of its supply from New York.

The Hudson is notable for its remarkably straight course from the rectangular turn at Sandy Hill to the Sound, and also for its deep valley with steeply rising rock walls. The influence of the tidal rise and fall is felt as far as Albany, while navigation is possible even beyond this city. Above the mouth of the Mohawk the river is small and unimportant; and if it were not for the fact that the tide holds back the water of the Hudson, it would never have become the important commercial artery that it now is.

Other Drainage Systems.—The Delaware River rises in New York State, draining part of the Catskills, and the neighboring region,

* Bigsby, Phil. Mag. Ser. IV, Vol. v, 1829, 1–15; 81–87; 263–274; 339–347; 424–431.

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into the Atlantic through Delaware Bay; and further west the Susquehanna tributaries have their headwaters on the southern side of the St. Lawrence divide. These drain very nearly one-fourth of the State, competing with the St. Lawrence for the greater part of the central plateau. By the time the Susquehanna leaves the State of New York, it has become a large river and the waters are carried southeastward into Chesapeake Bay. Farther west, in Cattaraugus and Chautauqua Counties, the Allegheny River enters New York; and, after a short course within the State, it re-enters Pennsylvania, thus draining a small corner of the State into the Gulf of Mexico, through the Ohio and Mississippi.

So the State of New York is a great divide region contributing water to no less than five well-known river systems, the St. Lawrence, Mississippi, Susquehanna, Delaware and Hudson, only one of which enters the sea in the State, or is even in large measure within its boundaries. A very little of the drainage of the State enters the sea through small streams in New Jersey and Connecticut. Therefore the water that falls on various parts of the State may enter the St. Lawrence, or it may pass over a much longer journey to the southward, possibly, even into the Gulf of Mexico.

Gorges and Waterfalls.—In many of the Northern States, waterfalls and gorges are notable and common features; but of none is this more true than of New York. Many of the streams, particularly those of the central plateau region, flow for a part of their distance in gorges and are interrupted by falls and rapids. Niagara is a type of these, which, though larger and more wonderful than its fellows, finds its counterpart in hundreds of places in other parts of the State. Among the Adirondacks and Catskills the streams are also tumbled into rapids or falls and are often found racing through gorges. A consideration of the causes for this peculiarity, as well as of the other physiographic features of the State, will be deferred until later papers.

Peculiar Importance of the New York Drainage.—Leaving out of question the æsthetic aspect of the drainage, for which the lakes, gorges and falls of New York are justly noted, and the commercial value of the water for power, there are several features of New York drainage which have had a unique influence upon the development of the State. A navigable river, the Hudson, reaches into the heart of the State, extending far up toward Lake Ontario. Indeed, with a canoe but a short portage is needed to reach this lake. As soon as the Indian obstacle was removed, these natural waterways

served as a pathway into interior New York, and indeed to the west.

As the necessity for transportation to and from these interior colonies increased, because of the great natural facilities, it became possible to add to the readily navigable Hudson and the large lake a system of artificial waterways, the canals. So New York is ramified by these, the most remarkable of all being the Erie, which, emerging from Lake Erie near Buffalo, passes along the upper member of the Lake Shore Plains Province and extends with a remarkable levelness over this plain to the divide at the head of the Mohawk, down the valley of which it extends to the Hudson. This canal and its tributaries have done more to develop the resources of the State of New York than almost any other feature; and both the main canal and the branches depend for their location upon the peculiar configuration and drainage of the State.

By means of the natural and artificial waterways, it is possible to reach into the very heart of the country. For a while it seemed as if railways had done away with the necessity and value of canals; but by enlarging them, and particularly by the use of electric power for movement, the future of the great canals seems more promising than ever. No canal in this country offers better facilities for enlargement and greater need of this improvement than does the Erie, and it may safely be predicted that this will be done.

Physiographic Features Illustrated in New York.

About New York as a centre it would be possible to build a complete physical geography. Within the boundaries of the State there are illustrated very nearly all of the important groups of physiographic features. Among rivers there are various forms and types, and of lakes there are both an abundance and a variety of kinds. Of coastline features illustration is furnished not merely along the sea shore of Long Island and the very southernmost angle of the State, but also along the shores of the Great Lakes, and, in a smaller way, along the shores of the smaller bodies of water. Mountains find illustration in several types; and although volcanoes are absent, lava rocks are found in the Palisades of the Hudson and in various other parts of the State.* Plateaus and plains cover more than one-half of the State and they exhibit varied features, while instances of cliffs and escarpments abound.

* See references on p. 103. Also, Kemp and Marsters, Trans. New York Acad. Sci. XI, 1891, 13–23.

Besides these greater earth features, there are many smaller ones, perhaps the most notable of which are those that have resulted from glacial action. There are terraces, ancient shore lines, various kinds of glacial hills and, indeed, illustrations of most of the features of the earth. In later pages of this discussion, these will be taken up for consideration. There are few States that offer within their own boundaries so rich an assemblage of physiographic illustration.

Geological Development of the State.

Deposit and Folding.—The Adirondacks are distinctly the oldest large area in the State, the only possible competitor being the crystalline highland region of the southwestern corner of the State (the real gneissic part of the Highland Province), where the Archean rocks of the New Jersey Highlands extend across the New York boundary. At the beginning of the Palæozoic, both of these areas of crystalline rock were mountainous lands facing the sea, which stretched away to the westward, and beneath which all the rest of the site of New York State was submerged. The southwestern highland mountains extended northward into New England; and toward the east they probably reached seaward beyond the present coast line. This mountain range also extended southwestward along the eastern part of the sea-coast States, and west of it was a great sea in the present Mississippi Valley. Whether the Adirondacks and this highland mountain range were ever connected, and what was the actual former extension of the two areas, cannot be told in the present state of geological knowledge. The record of much of the early history has been hidden beneath the strata of later age.

However, in the very early Palæozoic the waves of the sea beat at the western base of the southern highlands and these were then at least separated from the Adirondack area, which was at this time an island in the Palæozoic sea. This is shown to be true by a ring of early Palæozoic sedimentary rocks, which practically surround the mountains and in which fossil beaches can now be plainly detected. Later folding has probably affected the Adirondacks, and it is also quite probable that parts of these mountains have since that time been submerged; but the main post-Archean history of the Adirondacks is that of long-continued denudation, as a result of which the elevation has been greatly reduced. Throughout much of the Palæozoic, and apparently throughout all of the post-Palæozoic time, these mountains have been subjected to constant denudation. The structure and detailed history of the Adirondacks are very

BASED UPON THE STATE MUSEUM MAP.

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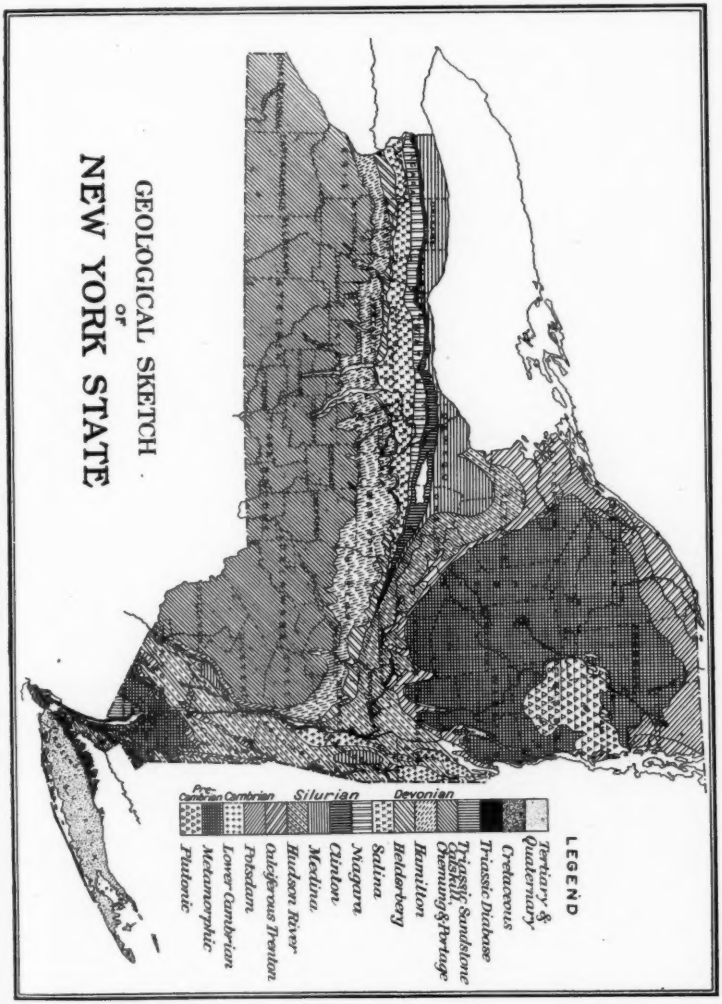
GEOLOGICAL SKETCH
OF
NEW YORK STATE
BASED UPON THE STATE MUSEUM MAP.
LEGEND
Tertiary & Quaternary
Cretaceous
Triassic Diabase
Triassic Sandstone
Catskill
Chemung & Portage
Hamilton
Helderberg
Salina
Niagara
Clinton
Medina
Hudson River
Oxyferous Trenton
Potsdam
Lower Cambrian
Metamorphic
Plutonic
Pre-Cambrian
Cambrian
Silurian
Devonian

obscurely understood, and little except the most general facts are at present known concerning it.

Next in the development of the State came a great overturning of the rocks along a line parallel to and near the crystalline highlands of the southwest. Indeed, these were undoubtedly involved in this folding, which profoundly influenced the southeastern portion of the State and all of western New England and eastern New York. Indeed, from the neighborhood of Quebec, southwestward as far as Virginia, and apparently beyond, this period witnessed the growth of a great mountain system, which has been called the Taconic system by reason of the fact that the Taconic Mountains, of the New York-Massachussetts boundary, have furnished good evidences of this system of folding. The rocks involved in the overturning are the older, crystalline pre-Palæozoic rocks and the Cambrian and Lower Silurian sedimentary strata; and, as a result of the mountain growth, these have been extensively folded and even broken or faulted. Since the rocks of the Upper Silurian age rest unconformably upon the sides of these uplifted strata, the age of the Taconic Mountain uplift is placed near the close of the Lower Silurian. By the folding the rocks were also extensively metamorphosed, the limestones often being changed to white marble, the sandstones to dense quartzite, the shales to slates, etc.; and in some places the metamorphism has gone so far that the original rocks are now changed to schists and even gneisses.

The folding and faulting were more intense in the northern part of the State than near the New Jersey line, and more in the east than in the west; and hence the rocks are more metamorphosed, and therefore more durable in the northern than in the southern counties. In the south, in Orange County, the folded rocks are bounded on both the east and the west by harder strata, and hence denudation has lowered them into the condition of a valley. The real Taconic ranges, near the New York-Massachusetts boundary, and their continuation along the Green Mountains of Vermont, furnish illustration of good-sized mountains. This is especially true of those, which, like Mount Graylock in Massachusetts, consist partly of a very durable quartzite. Since their formation these mountains have been very much worn, and there is every indication that they were once very lofty ranges. Among them the folds are very often overturned, and there are numerous illustrations of overthrust faults where the rocks have broken along a nearly horizontal plane, and the upper beds have been moved bodily over the lower. Some of these faults are of great extent.

Toward the west the mountain folding disappeared; but how far it extended cannot be told, for later rocks cover the folded strata. It certainly extended as far west as Little Falls, for the folds on the southern margin of the Adirondacks are of this age.

During the remainder of the Silurian and Devonian times, the condition of that part of New York which lies outside of the Adirondacks and the two southeastern provinces of folded rocks, lay beneath the sea, at least for the greater part of the time. This sea was on the average a shallow one, and it received contributions of sediment from the Adirondacks, the Taconic ranges, and also probably from the Canadian highlands. Shallow water conditions are almost everywhere indicated among these central New York strata, and the very coarseness of the deposits among the Catskills shows that land was near by at the time these were deposited. During these geological periods, there was deposited in this sea a depth of sediment which in the Catskills is fully 10,000 feet, in central New York, in the Genessee River valley, not less than 7,000 feet, and in the highlands of Chautauqua County, some 6,000–6,500 feet.* During this time, the straits that had connected the inland sea with the ocean north of the Adirondacks became filled and closed. The beginning of the St. Lawrence valley along the northern border of New York had been determined very early by a depression into which the sea entered.

While the Silurian and Devonian sediments were being laid down, there were evidently numerous minute changes in the land and water; but the average condition was one of slow subsidence of the general area which was beneath the sea. Beds of shale and limestone were being deposited over much of the State, although sandstones and conglomerates were formed in some places near shore lines. During the Salina of the Upper Silurian, conditions prevailed over central New York as a result of which extensive beds of rock salt were accumulated between the beds of shale, the total depth of the salt strata often being from 50 to 150 feet.† The reason

*Communicated by Prof. C. S. Prosser. For records of sections in New York, see Prosser, Proc. Am. Assoc. Adv. Sci. XXXVI, 1887, 208–9; Am. Geol. VI, 1890, 199–211; Proc. Rochester Acad. Sci. II, 1892, 49–104; Bull. Geol. Soc. Am. IV, 1893, 91–118. Fairchild, Proc. Rochester Acad. Sci. I, 1891, 182–186; 215–223.

†Eaton, Am. Journ. Sci. VI, 1823, 242–243; Smith, Am. Journ. Sci. XV, 1829, 6–12; Phil. Mag. VII, 1830, 198–201; Vanuxem, Geology of New York, Part III, 1842; Hall, same, Part IV, 1843; Gibson, Am. Journ. Sci. V, 1873, 362–369; Newberry, Trans. New York Acad. Sci. IV, 1887, 55–57; Wright, Science, VIII, 1886, 52; Newberry, Trans. New York Acad. Sci. IX, 1889, 39–45; Hall, Luther and Clark, Report 47, New York State Museum, 1894, 203–383.

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for these salt beds is apparently a shallowing of the New York sea accompanying a broad general uplift in Ohio, and neighboring States, which has been called the Cincinnati arch. Before this the conditions had favored the deposit of the thick Niagara limestone in clear and perhaps moderately deep water. By the shallowing of the sea this part of the State may have become a great salt vat, reached by the sea and subjected to evaporation so that beds of salt were precipitated and later covered by beds of very fine mud. After this the sea again entered this portion of the State, becoming clear open water, perhaps of considerable depth, and certainly free from land sediment. During this time another series of limestone-beds, the Helderberg and Corniferous, which extend from near the Hudson to Buffalo, were accumulated in the sea.

After this, throughout the Devonian, the conditions favored the deposit of extensive beds of shale, which in central New York often reached more than 3,000 feet in depth. These vary from fine textured clay rocks to sand layers, and from real clay to impure limestone and even to pure beds of limestone, a few of which occur in the series. In the east, along the line of the Taconic, the deposits in this sea were mainly sandstones and conglomerates, evidently because this was near the coast line. Here, in the region of the Catskills, the sandstones are between three and four thousand feet thick, and this is the main determining factor for the existence of the Catskill Mountains. Their location therefore depends primarily upon the existence of a shore line supplied with quantities of sand and pebbles. In some places these Catskill beds are conglomerates.

Conglomerates are also found in the extreme southwestern part of the State, these being remnants of a bed of upper Devonian conglomerate. They have attracted considerable attention because of their supposed resemblance to ruined cities, which has given the name "rock cities"* to these conglomerate rocks which have broken along the joint planes and then tumbled apart as a series of huge blocks. These have been undermined by the action of denudation which eats away the softer underlying shales and allows these huge blocks to assume various attitudes. It is probable that this layer has recently extended over a considerable part of the high southwestern plateau; and perhaps it has been the cause for the great height of this section, the overlying conglomerate cap protecting the soft shales from rapid denudation.

Whether the Carboniferous ever extended into New York State or not; and, if it did, how far it extended, are questions now impos-

* Hall, Geology of New York, Part IV, 1843, 284–285. Ashburner Penn. Geol. Survey, Report R., 1880, 49–78.

sible to answer; but there seems little reason to doubt that the Carboniferous rocks did extend for at least some distance into the State. Since the Carboniferous time, throughout the entire State, there has been an almost uninterrupted condition of land exposed to the air; and during this time much rock material must have been removed. Throughout the higher parts of the central plateau the rocks are of the upper Devonian age; and, unless some Carboniferous strata existed there, having since been removed, we must marvel at the minute amount of work done by denudation throughout all of the post-Palæozoic time. Therefore the fairest supposition is that the Carboniferous did extend well into New York, perhaps covering the entire plateau.

Final Uplift.—Perhaps early in the Carboniferous time, certainly before the close of that period, the entire State of New York was raised above the sea, a position which, so far as we know, it has since uninterruptedly maintained, excepting perhaps in some very limited localities and for a short time, as for instance along the Champlain* and Hudson River depression. This elevation was associated with the uplifting of the Appalachian Mountains; and although within the State of New York there was no excessive mountain folding at this time, the great area of rocks forming the State were raised as a general plateau uplift with some minor folds. The rocks of the plateau itself, and of the Lake Plains to the north of it, are so upraised as to dip very gradually to the south. Near the central part of the plateau, along the shores of Lake Cayuga, and elsewhere within the State, the strata were thrown into gentle undulations with east and west axes. Near the boundary of New York and Pennsylvania, east and southeast of Binghamton, the effect of the plateau folding is plainly seen in the rocks; and at the angle of junction of New York, Pennsylvania and New Jersey, the mountain folds are quite pronounced. Among the Catskills, while there is some folding, the real cause for the ruggedness of the mountains is the presence of the very massive and durable sandstone, which in some places has a depth of not less than 3,000 feet. Because the upper Devonian in this part of the State is sandstone rather than shale or sandy shale, the Catskill region rises in a series of prominent elevations which are carved into very mountainous outlines. There has also been greater uplift in this section and some folding; but denudation is the really potent cause for the carving of these mountains.

* Emmons, Geol. of New York, Part II, 1842, 127–134; 283–284; Kellogg, Science, XIX, 1892, 341.

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There are no means of telling in what form the uplift of the State left the surface. However, from the dip of the rocks it seems probable that the greatest elevations were in the north and east. The Adirondacks seem to have continued, as they had previously been, as a great central divide, from which, as from a highland, the streams radiated out in all directions. The Taconic ranges must have served to prevent the flow of New York waters toward the east, just as they do at present. The greater uplift of the Catskill area may have determined some of the drainage approximately along the course of the Hudson valley, while in the trough between the Catskills and the Adirondacks, the Mohawk naturally developed. If the St. Lawrence valley in its present line existed early in the history of the State, there must have been drainage toward it, and there is very little reason to doubt that some of the water of the State thus found its way northward.

However, the tilting of the rocks to the south must have determined this as a direction to be pursued by much of the drainage. Before we can be certain of what has happened to the rivers of the State we must first learn more about the early history of the streams in the Pennsylvania region. What has led the Delaware and Susquehanna waters across the Appalachians through their remarkable water-gaps? Was the tilting of the rocks beneath the plateau of central New York accomplished at the same time as the uplift of the Appalachians, or has it been a later development? If the former, then the greater part of the drainage of the western half of the State must have been toward the south; if the latter, this does not of necessity follow. It seems that the topography and drainage indicate the first rather than the second. North-flowing streams have an advantage in cutting their valleys in rocks that dip to the south.* By the law of monoclinal shifting,† as the country wears down, the divides should gradually retreat to the south; and so the north-flowing streams would constantly gain territory at the expense of those which were flowing toward the south. As a matter of fact, the north-flowing streams of New York have not pushed their headwaters very far back into the plateau, apparently not so far as they

* Of course this applies to any streams heading in a tilted region and flowing in opposite directions.

† This is, briefly, that in the settling of the surface of a country under the action of denudation, if the rocks are inclined, the divides will migrate in the direction of the dip. See Gilbert, Geology of the Henry Mountains, Washington, 1880, pp. 129 and 134; also Tarr, Elementary Physical Geography, p. 274.

would have done if they had been north-flowing streams at the beginning of the uplift of the plateau.

Another question is whether the country was also raised to its present height. Here again the answer must be somewhat doubtful but apparently in the negative. Had it originally been elevated to its present height, it should be denuded vastly more than it has been. Even granting a complete covering of Carboniferous rocks for the central plateau, the time that has elapsed since the close of the Carboniferous would have allowed more than 10,000 or 15,000 feet of strata to be removed. Besides this, the drainage systems indicate later elevation, as do other facts from outside of the State.*

The history seems to have been that of an uplift at the close of the Carboniferous, continued now and then, so that considerable denudation has in the meantime been possible; and then, in the mid-Tertiary, there came a decided uplift which allowed all the rivers of central New York to cut deep valleys, and which occurred long enough ago to admit of sufficient broadening of the valleys to produce a mature type of topography. With this uplift something like the present condition of drainage was introduced, although in the details many changes have been introduced by the ice invasion.

Post-Palæozoic Denudation.—As a result of this extensive denudation, any rocks that overlaid the Devonian have been removed; and, in a great part of the area, the Devonian and older strata are trenched deeply by valleys, so that the plateau is very much dissected by deeply-cut valleys, particularly near the divides. Although these are fairly well rounded, there remain great hilly masses between, and so only a mere beginning has been made toward the removal of the Devonian and older rocks.

In the progress of the denudation there has naturally resulted an attack upon the plateau, not only by the streams that have trenched it, but also by wasting away from the north. If, as seems evident, there existed parallel to Lake Ontario a river with an east and west extension, from this valley as a base there would naturally be an attack upon the rocks of the plateau which lies to the south. The strata of this plateau, dipping toward the south, exposed their outcrop edges towards the north. The hard rocks protected the soft; but, as these were undermined, the hard strata retreated in the direction of the dip, but always with a tendency

* Notably the fossil faunas of Mesozoic and early Tertiary ages, which seem to prove the existence of lowlands in the north-eastern part of the country. Also in the valley of Lake Champlain, deposits of Tertiary age prove a depression for this region.

to maintain an elevated position. An excellent example of this is seen between Rochester and Lewiston, especially near the latter place, where the hard Niagara limestone is covering soft shales and determining the position of the bold Niagara escarpment. Where the hard Helderberg limestone outcrops, the same tendency exists, and here again an escarpment results. This very marked influence of the rock structure on topography, producing so precipitous a slope in a region whose elevation is not great, could only result when the action of denudation had produced moderate effects during its present cycle.

The time is not yet ripe for the announcement of the complex histories of New York rivers, and hence for the elucidation of the development of many of the main topographic features of the State. The remarks made above are merely suggestive and are thrown out only as hints. However, it seems very certain that rivers with different kinds of valleys, and perhaps even with different courses, existed before the Tertiary uplift. Then the streams cut down through the rocks and carved their mature valley forms, perhaps not always in the courses which they formerly pursued.

Ice Invasion.—Then, as a last step in the development of the features of the State, came the Glacial Period, which came later than the Tertiary uplift, and during which practically the entire State of New York was covered with a thick sheet of ice. Why this came, how long it remained and why and when it disappeared are questions that do not now admit of definite answer. For some reason, possibly the elevation, from some source in northeastern Canada, an ice sheet spread out over New York, covering it as effectually as Greenland is covered by ice to-day. When this went away the surface of the land, though in many particulars hardly affected, was nevertheless in many respects strangely transformed. Over the surface was strewn a sheet of glacial deposit of variable thickness;* some of the hills were planed down and rounded, others were built up; some valleys were deepened, others were more or less completely filled; some streams were turned completely out of their valleys, some partly so interfered with, and many were locally transformed to lakes. The hundreds of lakes that dot the State were thus created, and even Lakes Erie and Ontario had their birth at the close of the ice period. The Falls of Niagara, and many other gorges and waterfalls, have also had their beginning as a result of

* Mather, Geology of New York, Part I, 1843, 158–228; Hall, same, Part IV, 1843, 318–341. Chamberlin, Third Annl. Rept. U. S. Geol. Survey, 1883, 347–379.

the ice action. With the withdrawal of the glacier, the form of the lakes varied, finally assuming their present condition. The sea also rose higher than it does at present, and parts of the Hudson-Champlain depression were submerged; and then, finally, the conditions of the present came about. Many of the details of the physiography of the State are a result of this ice invasion, and some of these subjects will serve as special topics for discussion.

Climate of the State.*

Throughout the State of New York there is abundant though not excessive rainfall; but, as in the other eastern States, there is liability of occasional drought. The total precipitation in inches varies from 25–30 in the northwestern part of Niagara County, and in some places north and east of the Adirondacks, to 60 inches near the coast and on the slopes of the Adirondacks. The rainfall probably amounts to more than this on the tops of these mountains. Over the greater part of the State the rainfall ranges from 35 to 50 inches. There is a greater percentage of cloudiness near the Lakes than at a distance from them, and over nearly one-half of the State the sun is obscured for more than 60 per cent. of the time during which it is above the horizon. In the southeastern portion of the State there is the least cloudiness.

The mean annual temperature ranges from 50° near the coast and 48° near Lake Erie, to less than 40° in the Adirondacks. The mean temperature for July ranges between 72° on the coast and 70° near Lake Erie, to less than 64° in the high Adirondacks. In January it ranges between 30° at the coast and 26° on the Lake Erie shore, to considerably less than 16° among the high Adirondacks.†

In the distribution of the isotherms there is much irregularity, for the influence of topography is very marked. It will be seen from this statement of temperatures that New York is peculiar in having high summer and low winter averages. However, it is not nearly so extreme as some of the interior States. For instance, St. Paul, Minnesota, has an average temperature of 72° in July and 8° in January; and St. Vincent, Minnesota, has an average of 65° in July and — 10° in January. On the other hand, San Francisco has a summer temperature of 69° and an average winter temperature of 50°, choosing single months for the averages.

* There is an admirable discussion of this subject in the Fifth Annual Report of the State Weather Bureau of New York, Department of Agriculture, Albany, N. Y., 1894, pp. 345–448, written by Mr. E. L. Turner.

† For the upper portions of the Adirondacks there are no reliable data.

Since New York has such low winter and high summer temperatures, the climate of the two seasons corresponds with climates in widely differing latitudes. This has been so well stated by Mr. Turner* that I quote from his description as follows :

"The isothermal line of 70 degrees, which will be observed on the chart for July to pass from the Great Lakes over northern New York, extends thence eastward through New England to the vicinity of the coast, where it again turns toward the southwest, meeting the line of 70 degrees which appears over eastern Long Island. This isothermal then passes directly eastward over the Atlantic near parallel 40 degrees, intersecting the coast of Europe in northern Spain. Reaching the warmer land surface, it tends somewhat north of east through Central France, Austria, Central Russia and Siberia. Near the eastern coast of the latter country it turns southward through 20 degrees of latitude and passing to the Pacific over the Island of Japan, continues nearly eastward, meeting the coast of America in Central California. Thence it follows the meridian of 120 degrees west well northward into British America before again turning to the southeast in the direction of the Great Lakes and northern New York.

"The line indicating 74 degrees in July passes from New York directly southward over the ocean until opposite Virginia; thence slightly south of east to Morocco in North Africa, where it turns northward to France; thence passes through Southern Europe (north of the Italian peninsula) to the Black Sea, through Central Asia at latitude 50 degrees, and near the coast turns southward to Japan. Diverging somewhat from the isotherm of 70 degrees, in its course over the Pacific, it touches America in Southern California, follows the Rocky Mountains northward to British America and thence takes a southeasterly direction to the Great Lakes and New York.

"In January, New York is to be classed with quite different regions of the globe from those named above. The isotherm of 15 degrees, which appears near the northern boundary of the State, passes thence over Labrador, the southeastern coast of Greenland and the Arctic Ocean. When well to the northward of Scandinavia it turns southeastward through Central Russia (passing north of St. Petersburgh) to the northern border of the Caspian Sea. Proceeding eastward to Northern Japan and northeastward over the Pacific it reaches the southern coast of Alaska, when it again trends

* 5th Annual Report, New York State Weather Bureau, 1894, pp. 361–2.

southward to South Dakota and finally passes north to the Lake Region to the St. Lawrence valley.

"The mean January temperature of 30 degrees (that of New York City) is found also in southern Newfoundland, Iceland and northern Norway. This isotherm turns sharply southward in the latter region and passes to eastern Germany, Austria and the northern border of the Black Sea, when its course becomes eastward to the Pacific. Like all the preceding lines it intersects Japan and thence passes northeastward to the Aleutian Islands. Following the American coast line to the border of the United States it turns southeastward to Missouri and thence passes to the southern shore of the Great Lakes."

There are several interesting climatic peculiarities in the State of New York. In general, the climate is that of an interior land area, though it is near enough to the seashore to be somewhat influenced by the ocean. The prevailing winds are from the west* and the alternations of weather conditions are due to the passage of successive areas of high and low pressure from west to east, carrying with them alternate conditions of clear, dry weather and cloudy, rainy weather.

In these respects New York is not unlike the other States of the north. During the clear anticyclonic times of high pressure conditions, cool or cold winds blow over the State from the north and the northwest, in winter spreading a blanket of cold air over the land. While the stormy conditions of the low-pressure areas prevail, air is drawn over the State from the south. It then comes either from the Atlantic or the Gulf (the latter particularly in the western portion), and so brings moist, warm conditions to the State. With the coming of the south wind, rain and snow often fall because the air in moving northward passes into colder regions and also rises over the plateau, thus being cooled down to the dew point, when precipitation must follow. When rain does not fall, the weather becomes warmer, in winter producing thaws, in summer causing heated terms.

These normal conditions of weather change are somewhat interrupted by the topographic features of the State, only a few of which can be mentioned. Long Island and the vicinity of New York City is distinctly the region most under the influence of the ocean of any part of the State; hence the winters are warmer, and on the seashore the summer heat is more moderate. The mean annual tem-

* This is often well illustrated in orchards, where the trees are all seen to incline towards the east.

perature is higher and the range in temperature less than in other portions of the State. Also in this part of the State the rainfall is greater than in other portions, with the probable exception of the high Adirondacks. During the summer the heat of the land is frequently tempered by the cool sea breezes that blow in from over the ocean.

The coldest and most variable portion of the State is the high Adirondacks, which, though cool in summer, become very cold in winter. Here there is much snowfall and the climate is distinctly that of mountains.

An influence very much like that of the ocean is exerted upon the climate of New York by the waters of the Great Lakes. They serve to temper the summer heat and to moderate the winter cold. When a cold wave overspreads the region, the temperature of the United States side of Lake Ontario is often 10° or 20° higher than it is on the Canadian side. This influence of the Great Lakes holds back the spring-time development of plants by the presence of the cold water; and hence vegetation is not liable to suffer from late frosts as it is in more distant regions where this development has proceeded farther. In the fall the warm body of water, with its temperature raised through the summer, does not cool so quickly as the land; and hence by its presence the water prevents frosts near the lake shore and lengthens the growing season. Also, during both summer and winter the presence of the water serves to moderate the climate. Upon the shores of the lakes there are real lake and land breezes, just as there are sea and land breezes along the ocean shore.

The effect of the water of the Great Lakes is felt very nearly all over the State, for many of the winds must blow over their surface before reaching other parts of the State; but the really noticeable influence is confined to a distance of but a few miles from the shore. This influence becomes particularly noticeable where the lake shore plains are backed by an escarpment, which serves to keep the lake influence partly confined within a narrow space. This is shown very well indeed near Lewiston at the base of the Niagara escarpment, and also along the Erie shore in Chautauqua County.* In both of these places the climates are so favorable that they are the sites

* See Tarr, Bulletin 109, Cornell University Agricultural Experiment Station, "Geological History of Chautauqua County," Ithaca, N. Y., Jan., 1896. Also for other parts of the Lake shores, Winchell, Proc. Am. Assoc. Adv. Sci. XIX, 1870, 106–117; Kirtland, Am. Journ. Sci. XIII, 1852, 215–219; Hazen, Bull. 10, U. S. Weather Bureau, 1893. The last three are not for New York, but illustrate lake effects in other States.

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of extensive fruit raising. To a less extent this is true of the whole lake shore.

In the Chautauqua region the difference is most remarkable. Upon ascending the escarpment the temperature becomes noticeably lower in a distance of a few miles. Very often rain falls upon the lake shore plains while snow is being precipitated on the hills; and frequently during the winter there is sleighing on the hilltops, while no snow exists upon the lower plains upon which one looks down. With this difference in elevation there is also a difference in the *amount* of precipitation, and the rainfall upon the hills is perceptibly greater than that on the plains. This is frequently well illustrated during the summer when thunder showers are seen hanging over the crest of the escarpment, while no rain falls in the grape belt of the lake shore plain.

There is also a perceptible effect upon the climate in the neighborhood of the smaller lakes. This is illustrated in the valleys of the several larger Finger Lakes which occupy deep trenches in the plateau. In these the winds are deflected somewhat, so that nearly north or south directions of wind are the common ones. Also the valley sides are warmer than the enclosing highland, partly because they are enclosed, but partly because of the influence of the water. Even the small body of water in the lakes serves to modify the neighboring climate very perceptibly. Near the lake shores, both the nights and the days of summer are cooler than they are upon the neighboring hills, and the winter climate is perceptibly less severe. Here also there are important fruit districts because of this marked modification of the climate, which locally is rendered less extreme.

In the Mohawk and Hudson River valleys there is the same kind of influence upon the climate, and we find that the isotherms extend well up into these valleys. Here also the winds are deflected, in the Mohawk to a general east and west direction, and in the Hudson to north and south directions. So the relation between the physiographic features of the State and the details of climate and weather is very intimate. In this place, however, no more can be done than to point out the bare fact.

RALPH S. TARR,
Cornell University,
Ithaca, N. Y.

THE ALASKAN BOUNDARY.

BY

MARCUS BAKER.

Three score and ten years ago the diplomatic agents of Russia and Great Britain met in St. Petersburg and proceeded to consider and adjust certain outstanding questions as to the respective rights of Russian and British subjects to hunt, fish, trade, navigate, and make settlements in the North Pacific. At the same time and as incidental thereto they agreed upon the sovereignty limits of their respective governments, and in terms defined a boundary line. This line, then and there described and accepted, constitutes the present eastern boundary of Alaska now attracting public attention. It is a line defined upon paper, but not upon the ground. It has never been surveyed or marked. Preparations for its survey and marking have been in progress for some years, and the time has now arrived for concluding preliminaries and agreeing upon some practicable mode of surveying and marking it.

But with the arrival of this time, lo! smoke, metaphorically speaking, in increasing volume appears along the line, drifting across and obscuring it. What for half a century had been clear and plain is now darkened, and through this smoke we discover here and there not the old familiar line with which we and our fathers before us were familiar, but a new and strange line farther west and south, and we see that Alaska has shrunken and British Columbia grown. At this our cheeks flush. Our faith in the friendliness and goodwill of a neighbor who would hint at, much less contend for such a change, is rudely shaken. Suspicion replaces frankness. For amicable arbitration of honest differences, bitter and costly litigation is foreshadowed, and long enduring resentment.

I purpose to set forth as clearly and fairly as I can within the compass of a magazine article, a plain statement of the Alaskan boundary question. And, in so speaking, I speak for myself alone; I speak in no official capacity, and with no other than public knowledge. The facts used are not drawn from the secret archives of any public or private office, but are public property, accessible to any one who will take the trouble to collect and arrange them.

Seldom is an international boundary line drawn into controversy without arousing a sentimental as well as a geographic interest.

And although prediction, as Senator Hoar has well said, "is not yet an exact science," I venture to predict that a very lively interest in, and spread of knowledge concerning Alaska is imminent, aroused and sustained by its boundary question. For, have we not among us the spirit of the Boston tea drinkers who declined the British tea accompanied by its odious tax? Not its *heavy* tax, mark you, but its odious because unjust tax.

All boundary questions are, from their very nature, geographic in character, and no purely geographic matter or question of the slightest complexity can be clearly stated, explained, or understood without maps. If you would know where a boundary is, or what it is, draw it on a map. By so doing its bearings and relations become clear at once. But I believe the lawyers and diplomatists do not make use of such graphic aid. It would be unprecedented. Words, only words, are relied upon to make clear what even a rude diagram would make clearer. But to introduce maps into a treaty defining a boundary, or into a statute, or into a deed of conveyance would be an innovation and an improvement, two things which the law resists with the force of a mighty inertia.

Let us then turn to the maps. For the proper and easy understanding of this matter about a dozen large, selected, typical maps which have been published by Russia, Great Britain, Canada, and the United States in the last 100 years are needful.* But it is impracticable to reproduce them here, and we must content ourselves with a few small maps and diagrams.

First, we have a map of Alaska and the adjoining region (Plate I), which shows the general situation of Alaska, and its relations to Canada and Siberia. The boundary line here shown is the familiar one appearing on all maps from 1825 to 1884, when a rather surprising and startling change was made in the line near its south end, of which we shall speak later.

Second, we have the southeastern strip of mainland and adjacent islands (Plate II), which may for convenience be called the Pan-

* The student who may wish to prosecute the study more fully will find the following maps instructive :

Stanford's Library Map of North America. London, 1886.

U. S. Coast and Geodetic Survey charts T, 8001 and 8050.

Maps in Senate Ex. Doc. No. 146, 50th Cong. 2d sess. Washington, 1889.

Vancouver's atlas. London, 1798.

Maps in Cook's voyage. London, 1784.

Map published by the St. Petersburg Academy of Sciences about 1750, showing the earliest Russian Discoveries in America. Various editions of this map have been published.

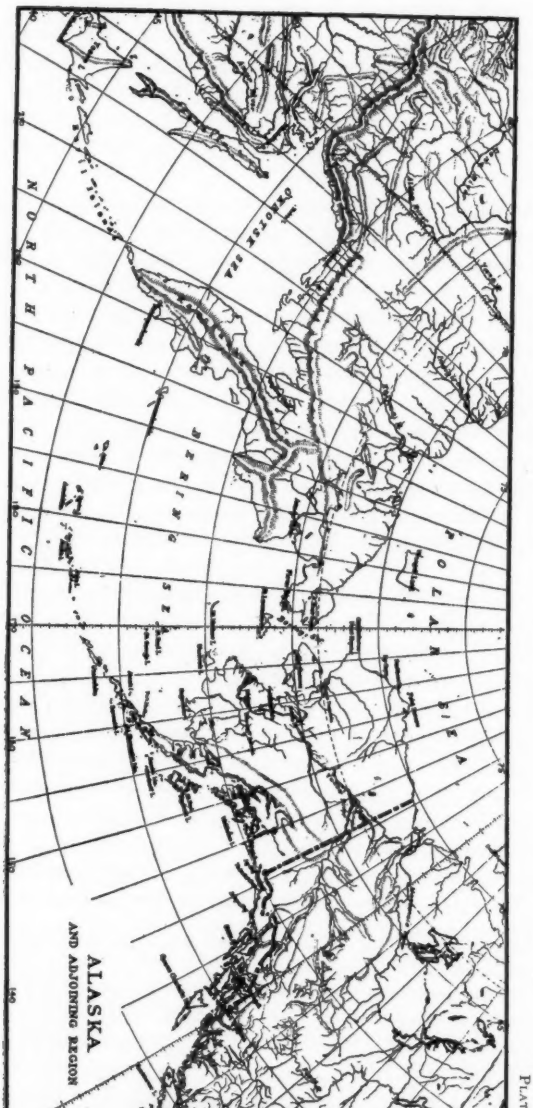
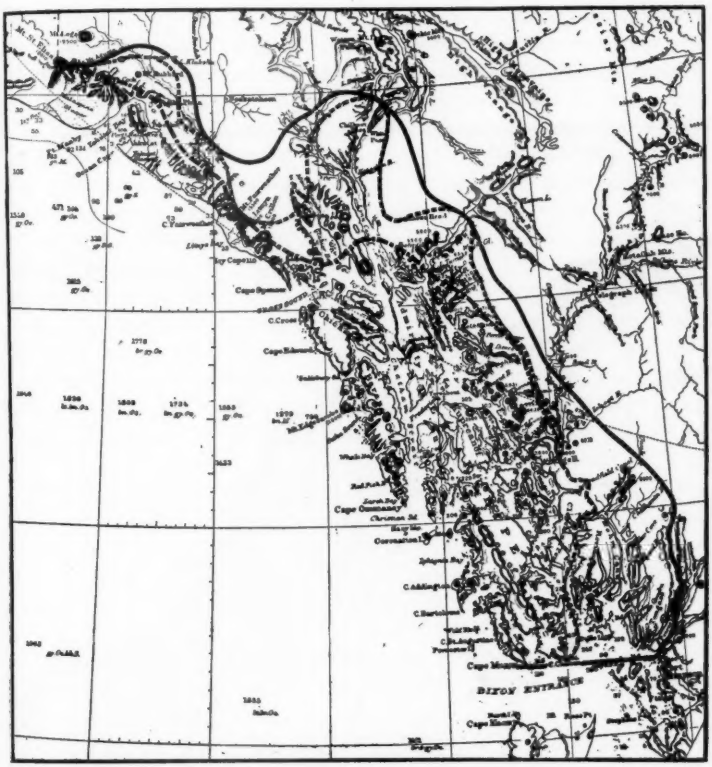

NORTH PACIFIC OCEAN
BEHRING SEA
POLAR SEA
ALASKA
AND ADJOINING REGION

PLATE I.

handle. This is the region where in recent years changes in boundary lines have appeared, changes which increase Canadian and diminish Alaskan territory.

PLATE II.



SOUTHEASTERN ALASKA FROM RECENT COAST SURVEY CHART.

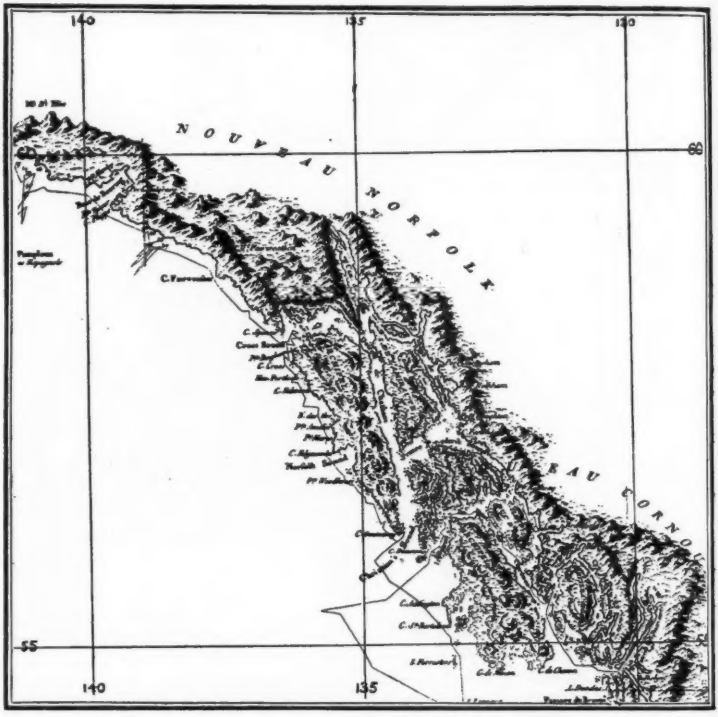
Boundary Line shown on U. S. Coast Survey Maps.
" " " " Canadian Map, 1884.
" " " " " " 1887.

The map is taken from one recently issued by the Coast Survey, except as to the boundary lines. The *first* or full black line is the one usually shown as the boundary. It, or one substantially like it, is the only one shown, so far as I am aware, that was used from the beginning, in 1825, down to 1884. The *second* line (dotted) appeared on a Canadian map of 1884. In its northern part it agrees approximately with the usual line, but at the south end it is moved westward some 60 miles from Portland Canal to Clarence

Strait and Behm Canal. The *third* line (broken) appeared on another Canadian map in 1887. On this map the line of 1884 was in the northern part moved over so that instead of going around the heads of the inlets and fiords it crossed them leaving their heads on the Canadian side.

Third, we have (Plate III) a photographic reproduction of the French edition of Vancouver's map of the Panhandle. This is the

PLATE III.



SOUTHEASTERN ALASKA FROM VANCOUVER'S ATLAS, 1798.

map which was doubtless used by the diplomatists of 1825 when they framed their description of the boundary line.

The Panhandle is seen to consist of a strip of rugged coast deeply indented by fiords. On or near this strip are the highest of North American mountains. Glaciers of great size and beauty abound and discharge their milky waters and ice masses into nearly every one of the numerous and profoundly deep fiords. In front of and guard-

ing the southern half of this strip is a great group of some 1100 islands. In honor of the Russian Tsar this archipelago received from the U. S. Coast Survey in 1867 the name of Alexander. It is mountainous, timbered, sparsely settled, and picturesque. Its total area, according to our best knowledge, is 14,200 square miles. The area of the strip of mainland comprised in the Panhandle is 34,350 square miles. Thus the area of the Panhandle, including the adjacent islands, is 48,550 square miles, or about that of New York State. The boundary line is either "the summit of the mountains situated parallel to the coast," or if these summits are more than 10 marine leagues (about 35 miles) from the coast, then the boundary is 35 miles from the coast and parallel to its winding. It is obvious, therefore, that surveys and geographic studies are needful to trace the "winding of the coast," and to learn more definitely about the summit of the mountains. Such surveys have been in progress for several years by surveyors of Canada and the United States. For surveys in the Panhandle, to secure information needful for determining the boundary, Congress has appropriated $50,000. It is an open question of fact as to where the line is, because it is *either* the "summit of the mountains parallel to the coast," *or* a line "parallel to the winding of the coast." This uncertainty is due to the imperfect geographic knowledge existing when the line was agreed upon. Better knowledge being now available, the alternative clause is to be resolved. As a matter of fact, it is to be determined:—Does the range of mountains contemplated by the treaty exist? If it does, then is it anywhere more than 35 miles from the coast? If it does not exist, or is everywhere or anywhere more than 35 miles from the coast, then it is to be determined what constitutes a line parallel to the winding of a very irregular coast line.

After this general introduction I now proceed to a more particular examination of the treaty of conveyance by which the United States acquired from Russia 28 years ago this large northern tract which before 1867 was nameless. The Russians spoke of their possessions in America, and we used the descriptive phrase, *Russian America.* After the sale, however, the descriptive phrase was no longer applicable. Accordingly, it was formally named Alaska.

If one would fully understand an ancient document he must do more than merely read it. It must be studied. Nay more, the conditions preceding and accompanying its production must be examined and understood. The lawyers tell us that if a statute is to be properly construed, there must be considered,

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first, the old law, *i. e.*, the law which existed when the statute under examination was enacted; *second*, the mischief which the statute was designed to remove, and *third*, the remedy provided by it. This wise outgrowth of experience will apply with great nicety to the interpretation of treaties. Would that I could carry the reader back to the time and circumstances under which, seventy years ago, the Rt. Hon. Stratford Canning, for England, and the Count de Nesselrode and Pierre de Poletica, for Russia, engaged in a little diplomatic conference, of which Alaska's eastern boundary was one of the results. Little cared they for a few leagues of barren coast. Greater interests were at stake, and now the minor part, Alaska's boundary, for the first time comes forward as the essential matter.

Let us briefly consider the development of the world's knowledge of Alaska, tracing it from the time when, by Bering's discovery in 1741, its first dim outlines began to appear, down to 1825, when the present boundary line was created. We may thus put ourselves in the place of the diplomatists and the people they represented, and be thus the better prepared to understand what they meant by noting carefully what they said and what they omitted to say.

Early in the last century the world did not know whether Asia and North America were united or separated. Certain vague rumors, scarcely traceable to any authentic source, affirmed their separation. Peter, greatest of Russian monarchs, the great Tsar Peter, ill content with this vagueness, determined to dissipate the prevailing ignorance on the subject, and ordered the organization and despatch of a party to find out. Thus originated the first expedition of Bering in 1725. I need not follow the details of the weary walk of two and a half years across Siberia (the North Land) to Okhotsk, the building of two vessels there, and the voyage in them around Kamchatka, to and through the strait that now bears the name of Bering. The report of this voyage carried, not sent, back to St. Petersburg aroused, as usual in such cases, more curiosity than it allayed, and Bering returns for his second and memorable voyage of 1741.

Two little vessels, with pious zeal christened the *St. Peter* and *St. Paul*, were in 1739 built in Okhotsk, and in the spring of 1741 were at Avatcha Bay in Kamchatka, ready for the voyage of discovery to the eastward. In a little harbor in the bay stands the present capital of Kamchatka, named after Bering's vessels, Petropavlovsk. Early in June, 1741, the little vessels, overcrowded with

men, ill provided with supplies and equipment, sailed away to the eastward. The usual story of storm and scurvy and Indian massacre follows. When sixteen days out a storm separated the ships, never to be reunited. July 15, Chirikof sighted land somewhere in what is now Southeastern Alaska, and three days later Bering similarly saw the land and landed somewhere near Kayak Island. Then began the return voyage through those unknown and dangerous regions, which even with our present knowledge are dangerous ground. In August a landing was made upon an island to bury the first sailor who died during the voyage, Shumagin by name, and the name of that group of islands commemorates this fact. Storm-tossed, uncertain of their whereabouts, worn with anxiety, reduced in number by scurvy and bad water, they welcomed the sight of the land where on November 6 they went ashore and decided to winter. A few days later a winter gale drove the *St. Peter* ashore, and in December, Bering, worn out with his labors, care and exposure, died and was buried on the island which has since borne his name. The tidings of this voyage carried back to St. Petersburg sustained and stimulated interest in these geographic matters. About 1750 the Academy of St. Petersburg published a map embodying the geographic results. This was the first map, not purely fanciful, to be made of this region. It was extensively copied, and for about forty years remained the best existing map of that region.

The next great stride in our knowledge of the "lay of the land" we owe to that redoubtable Englishman, Captain Cook, who, while we were in the midst of that memorable seven years' war waged in defence of our inherited and denied English liberties, was engaged in exploration in the Pacific Ocean. To the two great English navigators, Cook and Vancouver, we are indebted for a larger share of our geographic knowledge of the Alaskan region than to any other two men. Cook, in the summer of 1778, outlined in its main features the Alaskan coast from its southernmost point to Icy Cape. The comparison of Cook's map with the St. Petersburg map will interest and instruct any reader who has the good fortune to be able to compare them.

The publication of Cook's voyage revived, I had almost said violently revived, interest in a Northwest Passage. Commerce with China and the East was exceedingly profitable, and accordingly the search for a short cut to the Indies was long pursued and ardently hoped for. Hudson Bay admitted shipping far into the interior of North America. Was there not another Hudson Bay penetrating the opposite coast? Great Britain, ever alive to com-

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mercial advantage, felt that Cook's report warranted a further and more minute search. And hence it is that, before Washington was half through his first term, we see the incomparable Vancouver, commanding two ships, the *Discovery* and *Chatham*, outward bound on that memorable voyage of geographic research and diplomatic negotiation. For even then Great Britain had a boundary matter on hand, in this case with Spain. In the three summers of 1792, 1793 and 1794 he traced out and mapped the coast line of Western North America so fully, so carefully, and so accurately that, though a century has since elapsed, his maps remain of certain parts the best there are to this day. No one can fully appreciate or interpret the language of the treaty defining the boundary line without reading it with Vancouver's maps before him, as it doubtless was before the framers of the treaty as they wrote.

The description of the boundary line we are considering was first drawn up in 1825 in a convention between Russia and Great Britain. Between the publication of Vancouver's maps in 1798 and the convention of 1825, some advance in knowledge of the region had been made. Such advance was chiefly in details, little patches of filling in, here and there, and therefore we may be aided in understanding what the diplomatists knew about the region they were dividing by recording a few facts of which they were ignorant.

Already McKenzie had descended the river which bears his name to its Arctic mouth, but between that point and Icy Cape the map was a blank. Whether Alaska and Greenland were united or separated no man knew. All Alaska's interior was a blank on the map. On the Bering Sea coast the researches of Russian naval officers, from 1818 to 1823, had yielded an approximate indication of the coast line left blank by Cook, and had revealed the delta of a mighty river, the Kwikpak or Big river of the Eskimo. Little was known of this river beyond its mouth. That it was identical with the Yukon was unknown till long afterwards. For some years the Yukon is shown as draining into the Arctic Ocean near Point Barrow. At the date of the convention not even this piece of misinformation had got on to the maps. The Russian post at Nulato was not founded till 13 years later, and the English Fort Yukon not till 21 years later. St. Michael Redoubt of the Russians was still in the future. Sitka, however, or New Archangel, as the Russians called it, had been in existence for a quarter of a century, and was the thriving seat of a flourishing fur trade in the Alexander Archipelago.

With such geographic information, or perhaps I should say with

such want of it, it was that the Rt. Hon. Stratford Canning for England and the Count de Nesselrode and Pierre de Poletica for Russia met in St. Petersburg in 1825, to adjust, by diplomatic methods, certain outstanding differences between their respective governments.

I have now dwelt somewhat at length on the development and condition of the geographic knowledge existing when the diplomatists entered upon their conference. For clearly understanding the case it remains to add a brief statement as to the diplomatic situation.

That the high seas belong to no man or nation is an axiom. At least it seems so now. It is interesting therefore to recall that within the memory of men now living the Russian Tsar issued a proclamation, or ukaz as it is called, declaring that all the coast of the North Pacific Ocean and Bering Sea, from northern Japan on the Asiatic coast to southernmost Alaska on the American coast, was Russian territory, and warning all foreign vessels not to approach those coasts within 100 miles, except by reason of distress.

This ukaz was issued in 1821. Cruisers were sent out to enforce it. The brig *Pearl* of Boston was seized. Against this the United States protested. Great Britain also entered her protest. To a liberty loving people such an assumption was intolerable, and it, of course, promptly became a subject of international conference. The first outcome was a convention, three years later, in 1824, between Russia and the United States, by which Russia receded from her position and agreed that the North Pacific should be open to citizens of both nations for fishing, trading, and navigation. Russia agreed to make no settlements south of the famous parallel of 54° 40′, and the United States agreed to make none north of it. Great Britain sought, and the following year obtained, similar concessions. And at the same time, and by the same convention, the present southern and eastern boundary of Alaska was agreed upon. The leading feature of this conference was to obtain for Great Britain the same concessions which Russia had, the year before, made to the United States as to free navigation, fishing and trading in the North Pacific. In the preamble to this convention it is recited that the King and the Tsar, "being desirous of drawing still closer the ties of good understanding and friendship which unite them, by means of an agreement which may settle, upon a basis of reciprocal convenience different points connected with the commerce, navigation, and fisheries of their subjects on the Pacific Ocean, as well as the limits of

their respective possessions on the Northwest coast of America, have named plenipotentiaries," etc. The retraction by Russia of her claim to exclusive jurisdiction in the North Pacific was the main point. Incidentally a boundary line was to be agreed upon, a boundary line passing through a region that with one trifling exception had never been visited by a white man and for all the rest was as much a *terra incognita* as the South Polar region is to-day. To establish such a boundary was the incidental and not the principal object of the convention.

After this rather long though condensed historical introduction, we may now consider the very words used in the convention, reading them in the light of the historic facts and of Vancouver's maps, which, being not only the best, but almost the only maps then available for the purpose, were the ones used by the diplomatists.

The following is an extract from the Treaty by which Russia ceded Alaska to the United States in 1867:

ARTICLE I.

His Majesty the Emperor of all the Russias agrees to cede to the United States, by this convention, immediately upon the exchange of the ratifications thereof, all the territory and dominion now possessed by his said Majesty on the continent of America and in the adjacent islands, the same being contained within the geographical limits herein set forth, to wit: The eastern limit is the line of demarcation between the Russian and the British possessions in North America, as established by the convention between Russia and Great Britain, of February 28–16, 1825, and described in Articles III and IV of said convention, in the following terms:

"Commencing from the southernmost point of the island called Prince of Wales Island, which point lies in the parallel of 54 degrees 40 minutes north latitude, and between the 131st and the 133d degree of west longitude (meridian of Greenwich), the said line shall ascend to the north along the channel called Portland Channel, as far as the point of the continent where it strikes the 56th degree of north latitude; from this last-mentioned point, the line of demarcation shall follow the summit of the mountains situated parallel to the coast, as far as the point of intersection of the 141st degree of west longitude (of the same meridian); and finally, from the said point of intersection, the said meridian line of the 141st degree, in its prolongation as far as the Frozen Ocean.

"IV. With reference to the line of demarcation laid down in the preceding article, it is understood—

"1st. That the island called Prince of Wales Island shall belong wholly to Russia" (now, by this cession, to the United States).

"2d. That whenever the summit of the mountains which extend in a direction parallel to the coast from the 56th degree of north latitude to the point of intersection of the 141st degree of west longitude shall prove to be at the distance of more than ten marine leagues from the ocean, the limit between the British possessions and the line of coast which is to belong to Russia as above mentioned (that is to say. the limit to the possessions ceded by this convention), shall be formed by a line parallel to the winding of the coast, and which shall never exceed the distance of ten marine leagues therefrom."

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In studying the foregoing, attention should be constantly given to Vancouver's maps, of which one is here reproduced (Plate III), taken from the French edition, that being the edition which is supposed to have been used. The treaty is in two languages, French and English, both being signed. Thus, one is not a translation of the other. Both are originals, and they may rather be called two versions and each may help to interpret the other.

The boundary line is to start "from the southernmost point of Prince of Wales Island in latitude 54° 40′." Now, curiously enough, there was no Prince of Wales *island* in this region when the treaty was drawn up. Vancouver had named a large group of islands Prince of Wales *archipelago*, of which the largest island is now called Prince of Wales Island. It is obvious, from an inspection of the map, that no one then knew which was the southernmost point of Prince of Wales Archipelago, Cape Muzon or Cape Chacon. Hence was used "*the southernmost*" as a phrase which would apply to that one which should thereafter be found to fulfil this condition. We now know that the southernmost point is Cape Muzon, and that it is not on Prince of Wales Island at all, but on Dall Island. The line is therefore to start from Cape Muzon. What is its latitude? The diplomatists recognizing the fact that better knowledge might show that this point was not in latitude 54° 40′, provided, in the next clause, that whatever its latitude should thereafter prove to be, in any event the island (which should be archipelago) should belong to Russia (and now to the United States).

The parallel of 54° 40′ passes through Dixon Entrance, the only great break in the island barrier fronting the coast of western North America between Puget Sound on the south and its counterpart, Lynn Canal, on the north. This parallel was already a boundary line agreed upon by Russia and the United States in 1824. It was most natural, therefore, to start with this same parallel the following year when Great Britain and Russia were considering precisely the same matters. After starting from this southernmost point the line is to ascend to the northward along Portland Canal until it strikes the 56th degree of north latitude. Whether *it* refers to the boundary line or Portland Canal has been made a question. A peculiarly forced construction is needed to make it apply to the canal, which does not reach the 56th degree, and is clearly shown on Vancouver's map to terminate some miles south of that parallel. The line on reaching the 56th degree of north latitude is to follow the summit of the mountains parallel to

the coast until it encounters the 141st meridian of west longitude. The diplomatists recognizing the imperfect character of the information upon which they were compelled to rely added an alternative clause, to the effect that, if these mountains of Vancouver's map were farther inland than shown, then the boundary should be a line not more than 10 marine leagues (about 35 miles) from the coast and parallel to its winding.

We now know what the diplomatists did not know about that range of mountains which they saw on the maps before them, assumed to exist in fact, and selected for an international boundary line. It does not exist. No such clearly-defined crest line as Vancouver shows is to be found on the ground. I am not unmindful of the fact that this statement may be denied and elaborately argued. It is beside my present purpose to argue this point, and I therefore dismiss it with this bald statement. The alternative proposition of a line parallel to the coast is therefore to be adopted. In its application the question of coast line from which to measure will assume importance.

The coast line is the one which Vancouver and his recent followers in the Coast Survey have so fully traced out. It is the high-water mark of the briny deep. Vancouver's chief concern was to minutely trace out the continental outline. In this work he patiently followed to their heads the numerous long and deep fiords which indent the coast, and he so followed them because in no other way was it possible to tell whether the land bordering them was part of the continent or of an island near the continent. The waters are salt and very deep, the rise and fall of tide conspicuous, the tidal currents strong. In such a configuration of coast line there can be no question from the standpoint of a geographer or hydrographer as to where the coast line is. It is the high-water mark of tide water. This definition carries the coast line to the heads of the various inlets, canals, and fiords making up this intricate coast line to which the boundary line is to be parallel. It will be a matter for the commission, charged with the duty of settling this boundary matter, to interpret the phrase *parallel to the winding of the coast.* To determine the *intent* of the parties ought not to be difficult, but there is a rich field here for fine-spun casuistry, international law, and sentiment. The boundary line between Massachusetts and New Hampshire affords a parallel case. A boundary line three miles north of the Merrimac River, and parallel to its windings, was, by order of the King in council run out in 1741, and then remained in dispute for 150 years, having been finally accepted by

New Hampshire recently. A similar case is furnished by the so-called Land Grant railroads, where the alternate sections of a strip of land 20 miles wide on each side of the track have been granted. The interpretation in such cases has been held to be that the parallel line is what the mathematicians call an envelope. If such a line is laid down for the Alaska-British Columbia boundary, it would mean that every point on the line was 10 marine leagues from the nearest point on the coast. All points east of it would be more than 10 and all west of it less than 10 leagues from the nearest point on the coast. Such a line is, I conceive, the one which most nearly conforms to the spirit and intent of the treaty.

This interpretation wholly excludes Great Britain from jurisdiction over any of the waters of southeastern Alaska. And she should be so excluded, for she ceded all those waters to Russia in 1825, and we bought them from Russia in 1867. She has never exercised or claimed jurisdiction over any of them. True, an attempt was made in 1834 by the Hudson Bay Company to violate the treaty of 1825, but it failed. The *Dryad*, a vessel of that Company flying the British flag, was in 1834 fitted out, armed, and sent to what is now Fort Wrangell, for the purpose of taking possession in his Majesty's name, and building a fort to control the mouth of the Stikine. But the Russians were alert and a few days or weeks before the English arrived, Lieut. Zarembo, of the Russian navy, had landed, erected a stockade, mounted guns, and unfurled the Russian flag. Great Britain thereupon charged the Russians with violating the treaty of 1825 and demanded satisfaction. This well-known story was told me many years ago by one of the English participants who naïvely remarked that "when we arrived we looked the situation over, concluded they were too strong for us, counted noses, and sailed away."

When Russia and Great Britain were dividing their possessions in 1825 the existing interests involved were those of two great and rival fur companies, the Hudson Bay Company, and the Russian-American Company. If the range of mountains shown by Vancouver as approximately paralleling the coast actually existed, it would form a natural barrier between territory occupied by Hudson Bay traders coming overland and that similarly occupied by Russian traders approaching by sea and penetrating all the navigable waters of this intricate coast. The Russians had at that time secured actual control of all this coast and the trade on its border, while the English had secured control of the interior trade. So much of the convention of 1825 as relates to territorial division was simply

a formal recognition and declaration of the *status quo.* There can be no doubt that the underlying principles by which the negotiators were guided were to formally define and confirm to each party exclusive jurisdiction and control over those regions of which each had in fact acquired control. This view is sustained by the historic facts, by unquestioned acquiescence for 60 years, by the spirit of the treaty, and by its language, with a single exception. Adopt the ten marine league provision, which is the exception above noted, and there can be no boundary controversy. There will then be left a boundary question, and that question will be the practical one of marking out on the ground a line parallel to the winding of the coast. This is easily done on paper in accordance with common sense and legal precedents. Draw a line such that all points upon it are ten leagues from the nearest point on the coast. Every point on the Alaskan side of it will be less than, and every point on the Canadian side more than, 10 leagues from the coast. Having drawn such a crooked or curved line or series of curves, let the commissioners proceed to straighten out its senseless crooks and substitute a line near enough to it for all practical purposes, and which shall consist of a series of straight lines or lines which can be readily surveyed and marked. Such is the Alaska boundary question.

The American Claim.—The Americans have made no claim. On all American maps, however, and all other maps down to 1884, the line has been drawn along the parallel of 54° 40′ to the mouth of Portland Canal, thence up that canal, thence roughly parallel to the coast to the 141st meridian, and thence north along that meridian to the Arctic Ocean. West of that line Russia and after Russia the United States have always exercised exclusive jurisdiction. Such a line is specifically prescribed by the treaty, and no American student of the subject has ever been able to discover any reason for doubting that line.

The British Claim.—The British have made no formal claim. But as the time approaches for marking the line in accordance with the mutual agreement between Great Britain and the United States, certain Canadian publications are seen to foreshadow not a simple boundary question, but a boundary dispute, and a dispute which promises bitterness if any of the sundry lines which Canadian map makers have drawn in American waters are seriously adopted and contended for. Since 1884 it has been the practice of Canadian and English map-makers to carry the line "from the southernmost point of Prince of Wales Island" up Clarence Strait into Behm Canal, and thence

along that canal to latitude 56°, thus indicating that about 5,000 square miles of territory ceded by Russia to the United States had by this process become British territory. This change was made on an official Canadian map of 1884. As for the rest of the line on that map, it was carried around the head of all inlets, thus leaving those inlets in Alaska. Three years later another official Canadian map appeared in which the northern part of the line was no longer carried around the heads of the inlets, but across them, and the line throughout its extent moved much nearer the coast. It is this pushing the boundary line over on to Alaska territory and away from its old familiar place where the treaty put it that foreshadows the British claim.

Will Great Britain seriously and formally contend for such a change? Will she, under the guise of determining and marking the line in accordance with the spirit and intent of existing treaties, seek by making unwarranted claims to acquire territory? This will be made known ere long. Meanwhile let it be hoped that the newspapers and jingoes are all wrong and that her claim will be just. If just, there can be no boundary controversy; if unjust, no arbitration.

GEOGRAPHY FROM NATURE.

BY

RICHARD E. DODGE.

Teachers and students of geography are rapidly coming to recognize that the features of a region that we call geographic—the location of land and water in their various forms, the distribution of climatal regions, the habitations of man, his customs, characters, occupations, etc., are very largely determined by physiographic conditions. In order, therefore, to get at the true meaning of the geographic conditions, as we now see them, we must understand the physiography.

Such an intimate knowledge of the geographic features of a region as is most helpful and suggestive cannot be attained unless study is made of the features themselves, as they exist in nature. From the knowledge of the forms and processes to be seen about us, we gain a power to obtain a realizing sense of the geographic conditions of regions of the earth that we can have presented to us only through the words of travellers. Excursions then, for both teachers and students, ought to be a necessary part of geographic training. Excursions are bound to come sooner or later, and this short paper is a plea for their inauguration at once—wherever possible. The beginning may have to be a small one, but let there be a beginning soon. The outlay of time and money is not necessarily large, and I know from experience that teachers are more than repaid for any efforts that they make.

Any locality becomes a possible centre for the starting of such excursions, and under good guidance almost any place becomes profitable for minute and valuable study and illustration. I propose in the following pages to suggest the lines along which excursions should, to my mind, be conducted, and to illustrate my meaning by using New York City as a type centre from which to start. This, with the hope that excursions may be inaugurated in the near future, for the help of the public and private teacher of geography in this city and vicinity.

Analyzing any region of a rugged character, such as New England and New York, we find the physical features to consist of highlands and lowlands and intermediate slopes. The highlands may be of a more or less even altitude and continuous; or inter-

rupted, rugged and serrate. The lowlands may be the seat of streams of varied sizes or of arms of the sea. In any case the topographic forms are as they are now, because of what has happened in the past. They represent the resultant of the interaction of the processes of erosion on materials of varying hardness, modified more or less by the relative height of the land in reference to the sea.

Physiography has to deal with topographic forms as the result of processes which may now be seen in action, and naturally extends its realm to explaining how form has influenced human and organic history. Hence in studying the history of any region, such as New York, the physical features, as the result of process, become the foundation. Let me then first describe the features of the vicinity of New York City in a large way, and then offer a few suggestions concerning localities where a detailed study of processes and form can be made.

If we should climb to the summit of any altitude in north-eastern New Jersey, southern New York or south-western Connecticut, we should find all the harder rocks of the region,—the traps, schists and gneisses,—rising to an accordant skyline, not quite horizontal, but gently rising from sea-level inland. Above that skyland rise a few small peaks. Below it lies a lowland of considerable extent occupied by rivers, as the Hackensack and Passaic.

The even skyline is now known by geographers to show that, in what geologists call the Cretaceous times (day before yesterday geologically) the region hereabouts was worn down to sea-level or base-level. The remnants, or Monadnocks, rising above the skyline, were the little headlands or islands not worn down, because more resistant or more favorably situated to withstand the processes of erosion. At the end of Cretaceous times there was an uplift of the land in reference to the ocean, which gave new vigor to the streams, and the lowlands now found along the belts of softer rocks are evidences that in the succeeding, or Tertiary times, the regions were again worn down close to the sea.

These two most conspicuous features in our landscape—the skeletal frame that underlies and gives the general character to all our present topography,—are then features that have been made geological ages ago, and have been preserved until now, more or less altered by subsequent changes. The superficial detail of form we find to be largely due to the effects of the last ice epoch, which came at the beginning of the present geological age. The ice

ploughed up the western slope of the Palisades, scoring them most beautifully, crossed the Island of Manhattan and, standing with its melting edge over central Long Island, made from the rocks, gravel and sands it was carrying, the moraines that make the backbone of the Island, and the gravel plains that occur to the south and southeast of the moraines.

The last touches to the topography have been given in recent times and are due to the work of the atmosphere, the wind, the ocean and organisms. This work is still going on, though the changes are so small day by day that we cannot at first realize the importance of the process. Finally after the present topography was almost complete as we now see it, the region sank, the ocean waters advanced far inland along the lowlands of the Hudson, East River, and other rivers—once the seats of small fresh-water streams,—and a new line of contact between ocean and land was made. Thus the Bay of New York became a good harbor, with good anchorage, good access to the ocean and inland, well protected from winds and storms and in every way admirable. But for the recent sinking of the region, New York Island would have been but a small hill rising above a general plain nearly seventy-five miles inland.

This story has been read by the geologist and the geographer from the rocks and hills, the valleys and rivers, and we must take it for the basis of our further study, following as much into details as our elementary knowledge will permit.

With its past thus written in its physical features, the vicinity of New York becomes a wonderful field for the study of the relation of topography on the one hand to the conditions that have determined it,—the erosive processes, the geological structure and character of the rocks,—and on the other hand to the things it has largely determined—the human history. It thus becomes a region where, above all others, field excursions to see geography out of doors are very profitable and very possible.

In the conduct of field excursions the following plan seems to me, from some experience, to be the best. After a series of elementary introductory exercises and lectures in the house, the class should be taken out to see those processes in action that can best be studied in the region. The processes, and in a small way their effects, can be studied at the same time. Later, comparisons may be made to larger examples. The processes best to be seen in such excursions are the work of the atmosphere and rivers, wind and frost, the ocean and glaciers, taken in the order named. Any of

these may be well seen in the near neighborhood of New York City.

After such a study of the work of the form-producing agents, a study of the larger forms of the region from some elevated peak should be made, and also some study given to the effects of uplift and depression on the rivers and the ocean.

The foot of First Mountain at Upper Montclair, N. J., or the foot of the Palisades, at almost any spot, is a very fine place for the study of the work of the atmosphere, frost, gravity and a river. The vertical cliff of hard rock at the top and the talus of loose material, pulled down by gravity, give us two contrasts of slope whose meaning becomes at once clear to the youngest. The fresh trap compared with the surface of any block exposed to the weather shows the origin of the fine soil that occurs in the talus. The presence of the cracks in the rocks, wet with trickling water and perhaps occupied by small roots of trees, gives a fine example of the weathering and loosening processes at work. The relation of talus to hard rock and the effects of weathering are at once brought home to the observer. That the rocks of the ridge are becoming gradually broken and carried down toward the ocean is accepted without question.

If the excursion be to the foot of the Palisades, the work of the river in slowly removing the débris of the talus, and carrying it down stream in fine particles, is one that any child can and will observe, and thus the far-reaching effects produced by the interaction of the great subaerial processes of erosion and transportation are brought home to the mind of even the most uninitiated. If the student be a child, he at once realizes, as never before, that the shape of the earth is changing, that soil is the weathered rock, that highlands are high because resistant. Geography becomes to his mind for ever after a vital subject and what is even better, it becomes personal. The child feels that work is being accomplished and energy expended, and is impressed thereby. As one is awe-struck and fascinated by the work of a great engine, so we find the child, thus brought face to face with the great forces of Nature in their activity, is fascinated. He at once becomes desirous of watching the forces and studying the detail of form that plays over the features of the earth as the processes go on in their work. A hill is to him no longer an accident. It has a meaning.

If an excursion be made to the foot of a steep slope beside a river as at Fort Lee beside the Hudson, the position of the river in reference to the soft rock can be shown, for soft sandstones out-

crop at the foot of the Palisades at that point. That rivers tend to follow the softer rocks is a generalization that can be easily worked up to from this instance. If the Hudson does, the others ought to do so, and a map shows in the house, if we cannot go afield, that all the more important rivers of the vicinity of New York follow limestone belts in the harder schists and gneisses. Harlem River, Spuyten Duyvil Creek, Bronx River and Croton Lake are splendid examples of limestone soft rock lowlands occupied by water channels.

From such a study, passage can at once be made to the influence the rivers, in following the softer rocks, have had upon the paths of movement of man. That the railways follow the rivers and hence the lowlands, is a problem that any child will work out for himself if the suggestions be rightly given. The New York Central, the New York and Harlem River and the New York and Putnam railways are fine examples of such railroad paths. That the physical features of the land have had a great influence in determining certain of the habits of man is at once secured in the mind of the child or teacher, and they are ready to pass to questions a little more complicated or to a study of the other great form-producing processes.

After such a study of a river, a most excellent excursion is to some small ploughed field in the fall or early spring. If that field be on a hillside the formation of river valleys, their parts, the making of alluvial plains and deltas, and all the features of a whole river system can at once be seen in the miniature. Comparisons can be drawn between the features thus seen in a small way and the larger features of noted streams. The Rhine, the Mississippi, the Ganges, the Colorado and many other rivers of note can be shown in type. Above all, a comparative study of the parts of a small system, such as is to be seen in a ploughed field, brings out the meaning of the aging of a river, and the features of young, mature and old river valleys are presented so that the child of seven can at once classify the larger rivers of the world in their most conspicuous features. I have found from experience that teachers of several years' standing found more help from such an excursion as I have mentioned, than from any amount of illustration by picture or word.

After the subaerial processes have been studied as fully as time and circumstances will allow, an excursion should be made to the ocean shore wherever possible. Any shore like Far Rockaway, Arverne, etc., on Long Island or any of the accessible New Jersey

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shores, are splendid fields for study. Here we can see the ocean at its work of carving the land and carrying away the waste materials,—the chips of the carving,—to the depth of the sea. The work of the waves, the undertow, the tides, etc., can be well brought out. The formation of beaches, their daily change with each incoming tide and wave, the wave marks and ripple marks and the work done by little streams of water on exposed sand flats between tides, are worthy of a great deal of study and full of suggestion. We can at a shore usually see illustrated in a small way all the great processes of continental wear and building. In the pool left between two small ripple marks we may often find the miniature of the land east of the Appalachian summits with the accompanying deposits off shore that extend more than a hundred miles to sea. Once more we can here illustrate small things that at the same time serve to depict the processes so large and extensive that no eye can see them in their entirety.

Another phenomenon very frequently to be seen at a shore is the work of the wind in drifting the sand. We have here in the small dunes the type of the dunes of the Sahara, and on a windy day one gets a good illustration from personal experience of the cutting power of sand. Any of these features may be found along the shore of Long Island and a day, or even half a day, spent there is full of profit and helpfulness and of suggestions to the pupil, or to the teacher whose mind has not yet crystallized into such a state that it cannot adopt suggestions.

The other great form-producing process, the work of ice, cannot be studied in action in this vicinity. We can only study the results. Teachers and children asked to explain the scoring on all the harder rocks, the presence of isolated boulders on a foundation unlike them in composition, the distribution of clay and gravels, must recognize the work of some great agent not hitherto seen. The scratches would indicate a heavy dragging mass of something. The presence of the isolated boulders would suggest a great transporting agent that climbed the hills and paid but little attention to highlands and lowlands. The gravels should in their roundness suggest the work of water, and the morainic accumulations should suggest a dumping-ground where no sorting took place. Central Park, Mt. Morris Park, Van Cortland Park, the heights of Long Island, and many other places show the work of ice wonderfully well. In crossing Long Island to the ocean a fine section of the moraine is seen, and the topography can be well studied. Almost any cellar digging in New York City will show the washed gravels,

and there are chances on every hand to bring out the work of ice by illustration and by suggestion. I have found that even the younger children will accept the work of the ice sheet with clearness and without question, and will bring in many illustrations thereof that they have found in their wanderings.

After the processes have been studied thus, an excursion should be made to some unwooded hill, like First Mountain at Upper Montclair, N. J., to get a view of the larger physical features. From such an eminence even the younger children can see the meaning of the flat horizon line. They can picture in their minds that the whole land will in the course of time, other things remaining equal, be worn down to such a plain, close to the level of the sea. They get from this an idea of the great power of what would seem at first to be slight energy acting through a long time. The meaning of highland and lowland, of slopes and of the true office of rivers and ocean, atmosphere, and rain come home to them. Topography has then a meaning and a significance of great importance.

They are then ready to conceive the greater highlands and lowlands of the world and the conditions of the greater rivers. They understand why the seats of several great civilizations have been and are along the plains of an old river. The study of geography can then be made by comparison, and similarity and dissimilarity become the keynote along which advance is made. Geographic features compared to a standard, that of the home locality, have a greater meaning and remain more clear in the mind of the learner than they ever can if they are taken up as if they were unrelated facts having no common cause and to be compared only by position.

Many other processes of a smaller importance might be seen in a few more field excursions, and in any one of the excursions that I have suggested much more can be brought out than I have the time to mention here. The skilful teacher who feels himself more at home out of doors than in, can make a day's trip full of interest from beginning to end. His suggestive mind will find an object of study in small details that would escape the victim of text-book knowledge. Thus the well-trained teacher can teach not only the principles of geography in the field, but also the fact that the story is there for any one who will read it. Apparently trivial things are found perhaps to tell the greatest and most interesting story. Children are taught the value of alertness and of a questioning mind, ever ready to follow the suggestions Nature offers.

After one has seen in the field, from some height, the effects of

the rising and sinking of a land, the forms of shore lines in a large way may be attempted. Even the smaller child will see that the shore line of Connecticut or Maine is irregular because the rocks are hard and soft and the ocean has eaten into the softer streaks. They will compare the regions where there are such contrasts of rocks with a region like the shore of New Jersey where there is no such contrast. They will see that a sinking (drowning) of the land would make good harbors along an indented coast and that a smooth shore of either hard or soft rock makes a shore line devoid of harbors, and to be shunned by vessels. A study of the situation of large centres of habitation on the shore of New Jersey and of Connecticut, gives the examples illustrative, at home, of the dependence of man on the shore features and the recent history of the land. The reason for the great civilization and early commerce of Greece and Rome is at once brought home to the mind by comparison.

A more careful study of the effects of drowning upon a land and a river may be made in the case of New York City. The presence of tide water to Albany is an evidence that the region has sunk. A slight demand upon the imagination will serve to bring out the conditions of New York City had there been no sinking. The Hudson would then have been a small stream with water flowing down from a small drainage area, and the East River would have been but a smaller tributary. The effect of this drowning of the Hudson has been of the greatest importance upon the history of the whole continent. Tide water to Albany determined the position of the earlier trading posts there and along the Mohawk, all in easy communication at every season with New York and the Mother Country. It meant the development of agriculture and consequent colonization there and westward, into the great Plains along the natural pathways of commerce. It meant the final triumph of the English over the earlier settlers. It meant the present supremacy of New York City in its commerce, because of its easy communication, on the one hand with the great agricultural and mineral lands of the Western and Central States, and on the other its excellent harbor and easy communication at all seasons with European ports.

Agriculture and mining would have been just as possible had the region stood several hundred feet higher in reference to the sea, but commerce would not have been. That was determined by the recent continental movement that gave conditions favorable to inland trade by the Hudson and Mohawk, for coast-wise trade through the Sound, and of European trade because of a harbor

suited for vessels of deep draught. New York, the great seat of the "middle man," the great seat of export trade, has been made possible through many causes, but above all through the recent movements that have made the present physiographic conditions what they are.

That any city depends very largely upon its physical conditions for its growth no geographer at the present time hesitates to affirm. The very great importance of this fact is but more recently coming to be recognized.

The beginner in geography who is striving to master the lines of commerce and trade, the distribution, characters, customs, habits and occupations of peoples, finds these facts to his mind very much the result of accident. Experience may give him the conception, after many years, that topography and the physical history of a region have largely determined the human and organic history. His understanding of geography will be greatly hastened and eased if he can be given the influence of physiography at the start of his study of geography. It becomes the basis of classification of facts, the cause to which he can always refer and get helpful suggestion. Location of places becomes easy, for location is not a thing of accident, but the result of cause.

If a child recognize through observation early in life that form is the result of process and be shown the process, his eyes become opened, his interest awakened, and even very young children find a meaning in "dead" nature that is astounding to them and gives a quality to their conception of life that bears a rich fruit. Although many of the best text-books at the present time are giving geography along the lines of physiography, and are very helpful and suggestive, no child gets such a realizing sense of the actual thing from any source as he does from observation of the fact itself.

If the conditions do not allow of regular excursions for the child, he should be urged to bring in all he can from his own small excursions with parents and friends and from his paddling in the water of the gutter after a rain storm. But if he can see nothing by himself he ought to be given the chance to see through the well-trained eye of a good teacher.

Unfortunately many teachers have not an appreciative and questioning eye for the facts and features of nature, because they have never been trained in that regard. Such teachers if they would accept, should be given a chance to learn something of the features of the world about them from observation. Surely in a city like New York there should be some means provided, either by private

or public expenditure, whereby at least those who would might make trips, under good guidance, to neighboring localities for the purposes of field study.

Such field excursions have been given to the teachers of Washington, D. C., with interesting and profitable results. The plan has, I believe, also been tried in several other places. In all the cases that have come to my attention, the teachers have been glad to say that the outings have been of great profit to them.

New York City is very favorably situated for such field studies, and could such a series of excursions be started, many teachers would get at least a glimmer of a few of the ways in which physiography has determined the positions and habits of man. To such teachers geography would come to have some meaning, and the teaching of the subject matter would no longer, to the quickened mind, be but a perfunctory reviewing of pages of text. The spirit of the teacher would not allow any such deadening study of a live subject. In a series of five or six field excursions well arranged, and planned with an idea of leading from one subject rationally to another, the teachers would gain much that would be of great help to themselves in their private lives and in their teaching.

I have taken New York as an example of a centre from which excursions could be easily run because of its favorable situation geographically and because of its many lines of easy communication with points of special interest for illustration. Also because the city itself is such an example of the relation of man, in his progress, to the conditions of a physical nature about him.

New Haven, Hartford, Willimantic, Holyoke, Manchester, Philadelphia, Washington, St. Louis, Chicago and many other large cities are centres of almost equal value for illustration and study. In each case I have mentioned there is very much to be gained from a study of the physical features that have helped determine the position, growth and importance of the city. They are all cities in which the field method of study could be well prosecuted.

At the present time there is a great awakening in the methods of geographic teaching, and now is the time for superintendents, colleges, geographers and geographical societies to be of vast help to the schools by helping in the matter of excursions. The children, if possible, and at any rate the teachers, should be given the chance to study home geography, not from text-books, but from the only perfect geographic reader—Nature herself.

Let us hope that in the next few years excursions for teachers

and pupils may become a fixed part of the curriculum in many of our cities and towns. And let us also hope that such a desired end may be hastened through the co-operative interest, beneficence and guidance of geographers, colleges and the geographic societies. The latter especially have, in the organization and conducting of excursions, a field that they can make especially their own and thus come more closely in contact with the people than they have many of them been in the past.

TEACHERS COLLEGE,
New York City.

RECORD OF GEOGRAPHICAL PROGRESS.

AMERICA.

THE MARYLAND GEOLOGICAL SURVEY.—Maryland is now added to the States which have established a State Geological Survey. The General Assembly passed the act in March last. The Survey is under the direction of a commission composed of Governor Lowndes, State Comptroller Graham, President Gilman of Johns Hopkins University, and President Sylvester of the Maryland Agricultural College. The Commission, on March 25, appointed as State Geologist Dr. William Bullock Clark, Professor of Inorganic Geology in Johns Hopkins University. The Survey is planning to take up first the study of certain economic questions, particularly the building stones, in which the coöperation of Professor George P. Merrill, of the United States National Museum, will be engaged. At the same time other subjects, including geological mapping, will be considered, and the students of the Geological Department of Johns Hopkins University will be engaged with the coöperation of outside experts on special points. In this work Professor Clark intends to consider both the coastal plain formations embracing the Cretaceous and Tertiary deposits, as well as the Appalachian formations of the Palæozoic. Investigation upon the crystalline rocks will also be carried on in connection with the work upon the sedimentary series. The purposes of the Survey, as set forth in the Act, are:

(1.) An examination of the geological formations of the State, with special reference to their economic products, viz., building-stones, clays, ores and other mineral substances.

(2.) An examination and classification of the soils and a study of their adaptability to particular crops.

(3.) An examination of the physical features of the State with reference to their practical bearing upon the occupations of the people.

(4.) The preparation of special geological and economic maps to illustrate the resources of the State.

(5.) The preparation of special reports, with necessary illustrations and maps, which shall embrace both a general and detailed description of the geology and natural resources of the State.

(6.) The consideration of such other scientific and economic questions as in the judgment of the commissioners shall be deemed of value to the people of the State.

THE UTMOST SOURCE OF THE MISSOURI RIVER.—Mr. J. V. Brower, whose researches at the headwaters of the Mississippi are

well known, returned in June this year to the head sources of the Missouri River to complete the explorations which he conducted there in 1895. He intends to make a detailed survey of the sources of the Missouri for a final chart to replace the provisional map that appears in his book, "The Missouri River and its Utmost Source," just published. He expects that it will require ten months to complete the work. He ascertained last year that the largest upper branch of the Missouri does not flow through the lower Red Rock Lake in Montana as was supposed, but issues from a cavity of volcanic origin, at the summit of the Rocky Mountains, west of Henry's Lake, Idaho, and just across the boundary between that State and Montana. According to his observations, this ultimate source of the Missouri is in 44° 35′ N. latitude and 111° 38′ W. longitude, and is distant 2,945 miles from the mouth of the Missouri and 4,221 miles from the Gulf of Mexico. The elevation above mean sea level is about 8,000 feet. Mr. Brower started from St. Paul on his journey to the Missouri's sources on July 28, 1895, and the following statement of his work is condensed from his new book.

Passing through Helena, Mont., he went south to Lima in the same State, a little town in the valley of the Missouri about ten miles above the red butte from which the river at this point takes its name (Red Rock Creek). In order to identify the headwater branch of the Missouri it was necessary to determine the relative importance of all the larger, upper branches and this work occupied from Aug. 6 to Aug. 28, leading to the conclusion that the stream flowing through Culver's Cañon into the so-called Red Rock Creek which, lower down, is known as the Missouri, was, probably, the ultimate source of the great river. On Aug. 29, therefore, Mr. Brower re-entered Culver's Cañon, whose exploration he had begun on Aug. 5.

His party advanced with much difficulty up the cañon, as ledges, declivities and fallen timber constantly impeded the way. The summit of the Rocky Mountain range towards which they were struggling was in full view. Following the stream, the party finally arrived at a small flat, of a marshy nature, at the west end of which is a little body of water which Mr. Brower named Lillian Lake. The stream does not run through it. A short distance beyond Lillian Lake, Mr. Brower suddenly came in full view of a hole in the summit of the Rocky Mountains, just west of the crest of the main range. Circled around are numerous peaks.

"From this Hole in the Rocky Mountains," writes Mr. Brower,

"the little rivulet, two feet wide and scarcely two inches in depth, drawing its utmost supply from the uplifts surrounding it, takes its course out into and down through Culver's Cañon to the valleys below, broadening, deepening and strengthening from the base of adjacent and enormous ranges on every hand, until its turbulent waters, severing the mountains and channeling the valleys, open the gate to an issue in the parent ocean, thousands of miles away, by the longest continuous and uninterrupted river channel known to the world."

Mr. Brower believes that his work is the first discovery of the utmost limit of the channel of the Missouri River, but if any legitimate record exists of an earlier geographical exploration of the locality he and his companion (Mr. Culver) will cheerfully yield the honor of a first discovery.

GEOGRAPHICAL RESULTS OF THE GEOLOGICAL SURVEY OF CANADA IN 1895.—A summary Report of the Geological Survey of Canada for 1895, by Dr. George M. Dawson, Director, has been published (Ottawa, 1896). While geographical exploration was not so prominent a feature of the work as in 1894, some geographical results of importance were attained. In the northern part of Quebec province Dr. R. Bell crossed the height of land from Grand Lake, near the sources of the Ottawa, and descended the Nottaway (Noddawai) River to its mouth at the southern end of James Bay. The country he crossed was comparatively near to the inhabited parts of Quebec, but much of it had not been mapped, and it was uncertain whether the river that took its rise near Grand Lake was a part of the Nottaway system, or was included in a more western fluvial system. Dr. Bell met here a large area of Huronian rocks. It is the rocks of the Huronian system which contain the auriferous quartz veins in the Rainy River and Thunder Bay districts of western Ontario, where Mr. W. McInnes has just collected the information needed to produce the Seine River and Shebandowan map sheets which will facilitate the work of miners who are seeking gold. Typical Huronian areas are also found in the neighborhood of Lakes Temiscaming and Nipissing and the adjacent Sudbury district. The latter is well known for its nickeliferous pyrrhotites, and this metal is being found in the Huronian areas above referred to.

Systematic surveys of both sides of the lower Ottawa were continued by Dr. R. W. Ells, and in the region between the Ottawa and the St. Lawrence, and their geological features in some detail are now being laid down on a scale of four miles to the inch.

Mr. A. P. Low continued his explorations in the Labrador peninsula. He ascended to the sources of the Manikugan River and examined the country on both sides of the main water-shed there. Granites, Laurentian gneisses and limestones, with intrusive anorthosite, characterize the whole region he traversed.

Mr. J. B. Tyrrell carried out exploratory surveys northeast of Lake Winnipeg in Manitoba, mapping the courses of several rivers and locating the positions of a number of lakes. Granitic and gneissic rocks characterize the whole of this district.

The work of the survey was largely devoted to the mapping of definite areas, particularly some of those which are deriving special interest on account of their metalliferous resources, such as the West Kootanie district of British Columbia, into which a large mining population is gathering where there were no white inhabitants a few years ago. Thus, Mr. R. G. McConnell has been engaged upon the geographical, topographical and geological data needed for the West Kootanie sheet of the geological map, Mr. J. McEvoy has been working upon the Shuswap (British Columbia) sheet, Mr. H. Fletcher has been revising the maps of the Sydney coal fields of Cape Breton, Nova Scotia, and Mr. E. R. Faribault has continued his mapping of the Cambrian gold-bearing rocks of the Atlantic coast on a scale of one mile to the inch.

This mapping, not being based upon detailed and precise topographic surveys, of course necessitates considerable geographical work in the way of measurements, traverses of country and so on, and thus far adds to geography. The resulting maps are not products of the greatest precision, but the effort is to make them adequate for the scale adopted and they are far superior to all previous mapping of these regions.

The Swedish Expedition to Tierra del Fuego.—Dr. Otto Nordenskiöld, leader of the Swedish Expedition which went to Tierra del Fuego in 1895, has sent to *Annales de Géographie* (No. 21, April, 1896) some information about the progress of his party, writing from Punta Arenas on Feb. 23, 1896. Dr. Nordenskiöld is geologist, Dr. Ohlin, zoologist, and Mr. Dusén, botanist of the party. After outfitting at Buenos Ayres they left, early in November last, for Punta Arenas on the north side of the Straits of Magellan. Dr. Ohlin has since made that town his headquarters and has been engaged in the study of the marine fauna of the Straits and the coast waters as far as Cape Horn. When Dr. Nordenskiöld wrote, he and Mr. Dusén had just returned from a trip

in the northern and central parts of Tierra del Fuego. Its coasts are now very well known and are inhabited to a considerable extent, but the interior has been completely traversed only by the Commission which delimited the boundary between Chile and Argentina.

Starting on horses from the mouth of the Rio Grande, the largest river of the island, the explorers ascended an affluent of that river, the route being, in the main, parallel with the boundary line and about thirty miles east of it. In about 54° 25′ S. latitude they saw from a height Lake Fagnano, which was discovered by the Boundary Commission, and which is said to be nearly sixty miles long. The way south to the lake was open, but as Dr. Nordenskiöld intended to reach it from Admiralty Sound and to study the Cordilleras from that point of approach, he did not continue his inland journey further south.

While the northern coast region is dissected by numerous valleys this feature of denudation is not at all so conspicuous in the interior, the plain being low and often marshy as far west as the Cordilleras and drained by small streams without noteworthy valleys. South of the Rio Grande the country is forest covered, but is everywhere penetrable. Morainic material overspreads tertiary deposits and is itself covered with gravel, probably of former stream beds. Evidences of a post-glacial uplift of from seventy to a hundred feet were observed on the west side of the traversed region. The Straits of Magellan form, only in some special instances, a zoological and botanical boundary. Dr. Nordenskiöld expected to remain on the island until the beginning of the Antarctic winter.

Topographical Maps in Geography Classes.—The Conference on Geography in 1892 emphasized the importance of placing good topographical maps in the hands of students. A committee of the Conference made a valuable report on "Governmental Maps for use in Schools," describing over fifty phases of topographical relief that are well illustrated by maps, which may be obtained free or for a nominal sum. In the four States whose topographical maps have been completed, the sheets may be used with much advantage in the study of local and State geography. Inquiries addressed by the Society to the Boards of Education in these States have elicited the following information:

In Massachusetts the students in the normal schools are now receiving some training of a nature to enable them, as teachers, to illustrate the physiographic side of geography by the use of the map sheets. Such instruction is also given to some extent in the

high schools. A copy of the State map (fifty-four sheets) was given in 1895 to each of the high and normal schools. It is not supplied to the grammar schools.

Rhode Island is just publishing a monograph by William M. Davis, Professor of Physical Geography in Harvard University, with the design of aiding teachers to use the map sheets advantageously in the class-room and in outdoor study. Instruction to this end is also given in the normal but not in the high schools. The State distributes the map (twelve sheets) free to all the public schools and libraries. The map is not yet used to any extent in the grammar and high schools.

Connecticut does not distribute the State map (thirty-three sheets) free of charge. There is beginning to be some demand for it from the public schools; and students in the normal schools receive some instruction in physiography, but little or nothing is yet done in this line in the high schools. The State has printed and will supply to teachers a pamphlet of fourteen pages by Professor William M. Davis, entitled "The State Map of Connecticut as an Aid to the Study of Geography in Grammar and High Schools." The pamphlet deals chiefly with the manner in which the forms of land and water, soils, climate, etc., and sources of power such as coal, water-falls, etc., in their relation to the occupation of the earth by man, may be brought more clearly to the understanding of young scholars by the aid of the State map. This little work is a timely and much needed Aid for teachers, abounding, as it does, in suggestions for the more scientific teaching of geography. The Connecticut Normal schools, next season, will give instruction in the line indicated by this pamphlet.

New Jersey has distributed her map (twenty sheets) to all the public schools. It includes a general map of the State, a relief map indicating altitudes by shading, and a geological map.

EUROPE.

THE DANUBE SHIP CANAL.—The lower Danube is about to be opened to navigation by large boats by the completion of the ship canal at the Iron Gates. For forty years the passage of the Iron Gates, at all times difficult and dangerous, has been impracticable for an average of 117 out of the 275 days of navigation in the year, for boats drawing five feet, and at no time has the river been navigable between Bazias and the Iron Gates, eighty miles further down the river, for boats drawing more than six feet. The interruptions begin just below Bazias, where the Danube quits the Hungarian

plain, and in the succeeding eighty miles to the Iron Gates the bed of the river cuts in several places almost at right angles across the strike of beds of crystalline schists and granites, creating rapids and rocky shoals. Finally the channel is barred by the Prigada reef, a wall over 350 yards wide, emerging above the surface at low water, running near the left bank for over a mile and then crossing diagonally to the right, just above Sibb. This wall, with smaller reefs, constitutes the Iron Gates proper, and has formed a dangerous cataract throughout its entire length. The obstructions between Bazias and the Iron Gate have been removed and a canal has been excavated through the Prigada and other reefs of the Iron Gate, along the southern or Servian side of the river. The canal is about two miles long, 260 feet wide and ten feet deep, and the Danube will now be navigable for the largest river steamers from Vienna to the Black Sea. The formal opening to traffic will occur on September 27, and the occasion will be a feature of the Hungarian Millennium festival.

ORIGIN OF THE BALTIC SEA.—The *Geographical Journal* for April prints a summary of a paper read at Lübeck, last year, by Professor Rudolf Credner on the origin and evolution of the Baltic Sea. The present condition of the Baltic is merely a stage in its evolution, and Professor Credner refers to the gradual changes in its coast line which are continuously in progress. The cause of the depression, now occupied by the sea, was a movement of the crust which, by a series of faults, let down a portion of the surface consisting of different geological series. The basin thus formed has been greatly modified by processes of erosion and accumulation, largely the result of ice action. Thus the main features of the Baltic were blocked out and then many striking features were brought about by gradual elevation and depression, as is shown by the evidence of the marine fauna, which was at one time that of salt water, then of brackish water, and again of fresh water; and so the changes went on as the rising or falling of the crust brought the general depression more freely into communication with the outer ocean or restricted or completely cut off its outlet. Observations on the Scandinavian and Finnish coasts seem to prove that the present is a period of slow elevation.

THE GEOLOGICAL EXPEDITION TO NOVAYA ZEMLYA.—M. Th. Chernyshev reported to the Russian Geographical Society on January 2, on the geological expedition to Novaya Zemlya last sum-

mer. The *Geographical Journal* says that the expedition, which left Archangel on July 22, landed at Matochkin Shar, the strait separating the two large islands, eight days later, explored its coasts and entered the strait, but its eastern end was ice-blocked and the steamer *Vladimir*, therefore, could not reach the Kara Sea at that place. The party, using sledges, crossed Novaya Zemlya in six days in the latitude of Little Karmakuly settlement, reaching the Kara Sea at Abrosimov Bay. Proofs were found of the glaciation of the land during the ice age and of the secular elevation, at least of the southern island, during recent times. Some geographical positions were fixed and the expedition returned to Archangel on September 21 with rich geological collections.

PROTECTING SCHLESWIG'S WEST COAST.—The Hallig Islands off the west coast of Schleswig protect that coast to a large extent from the destructive force of ocean storms. But some of the smaller of these islands have been damaged and are liable to be destroyed by violent storms. *Petermanns Mitteilungen* (1896, part II.) says the Prussian government has decided to build a dike of piles and bushwork around Oland, Gröde and Appeland to be connected by an embankment with the mainland, on the east, and also with the island of Langeness on the west.

AFRICA.

THE EAST AFRICAN DWARFS.—In Dr. A. Donaldson Smith's address before the American Geographical Society on April 13, on his sixteen months' journey, in 1894–95, among the Somalis and Gallas, from the Gulf of Aden southwestward to the salt lake Stephanie and Lake Rudolf, near the eastern limits of the Upper Nile basin, he alluded to his visit to a dwarf tribe living north of Lake Stephanie. In fact he is the only explorer who has seen any of the East African dwarfs in their home, though there has been undoubted evidence of their existence. Dr. Smith has supplied the following facts about the tribe he visited:

"The Dume pigmies inhabit a mountainous tract of country only five miles square and lying twenty-five miles north of Lake Stephanie. I did not have a chance to see much of them as I had to push on to Rudolf, but I do not think they number over 1,200 souls all told. They live in little hamlets composed of about thirty huts each, the huts being made simply of grass and weeds, roughly tied and thrown over bent sticks.

"The Dume have been conquered by a neighboring tribe to the

South called the Burle and are so hemmed in by different tribes on all sides that they have been unable to procure a living by hunting and have been obliged to raise goats and even to till the ground. They go absolutely naked, not even wearing sandals. Their average height is about five feet. They are quite black, but with a very slight copper tint in some cases. They are very well formed, but with negroid features. They have woolly hair and are uncircumcised. They still hunt elephants with poisoned arrows, but game is not abundant. They appear to have no idea of morality, but most of the men take a permanent concubine so as to raise a family they may call their own after they get well on in life.

"There is a tribe called the Bunno living just west of the Dume, two-thirds of whom are also undersized and they are undoubtedly related to the Dume, but intermarriage with other tribes has increased the size of many. I believe all the country north of the two lakes was formerly peopled by pigmies, as I saw so many undersized men and women among the Mela, a tribe I visited eighty miles north of Rudolf, among the Amar, a tribe west of Stephanie, and among several other tribes about these regions, besides the Dume and Bunno. It is probable that they are all degenerate species, except the Dume, who are of uniform size, but even they do not come down to the size of Stanley's pigmies,—four and a half feet. I collected a few words of the Dume language, which I shall publish in the appendix of a book I am writing, and which will be published next autumn."

Dr. Henry Schlichter of the British Museum collated (*Scottish Geographical Magazine*, 1892, June and July) all the reports about East African dwarfs with a view to answering the vexed question: "Do pigmy tribes exist in East Africa, and if so, where?" He made a careful summary of these reports and the evidence he adduced was conclusive proof of the existence of these dwarfs. He found that as far back as 1826 Captain Boteler had brought information about the East African dwarfs, and that when travelling in Abyssinia, Shoa and Kaffa, Messrs. Harris, Krapf, d'Abbadie and Hartmann had heard much of the existence of pigmies in the unexplored country just a little south; and that Avanchers, Krapf and d'Abbadie saw numbers of these dwarfs, though not in their habitat.

The evidence Dr. Schlichter adduced seemed to justify the conclusion that there were dwarf tribes living near the southern border of Kaffa, the southernmost part of Abyssinia, and in the neighborhood of the thirty-sixth meridian east of Greenwich, and the habitat of the Dume is near that meridian. The Teleki expedition

which discovered Lake Stephanie (1888) did not penetrate quite far enough north to discover the Dume. It was supposed that one of these dwarf tribes was called the Doko, but Dr. Smith met this word only among the Galla people and it means "a poor man."

Desiccation of Central African Lakes.—Mr. Alfred Sharpe in the *Geographical Journal* (1896, April) says that with the exception of the Shire River (outlet of Lake Nyassa), Luapula and Chambezi (eastern Congo sources), and the Loangwa (northern tributary of the Zambesi), he knows of no other rivers of British Central Africa that are navigable for any important distance. He inclines to the theory now most commonly accepted, that the gradual desiccation of Central African lakes, observable for some years past, will not be a persistent phenomenon, as some theorists have believed, but that it is merely one phase of the results of meteorological conditions not yet understood; that is, that there are succeeding cycles of rising or falling waters in these African lakes, due to increasing or decreasing rainfall. The evidence we have of the various levels of Tanganyika's surface since Burton's time tends strongly to support this conclusion. Some of the lakes also are silting up, as Lake Mweru, whose southern end is being filled with detrital deposits from the Luapula River, and great marshes there were formerly a part of the lake. Recent unusually dry years have allowed vegetation to get a hold on the shallow muddy bottoms of lakes Shirwa and Pamalombe (near the southern end of Nyassa) and are now converting them into marshes. Lake Bangweolo appears to be filling up in the same manner, at least at its southern end. There has not been much recent change in the level of Lake Nyassa, though a slight fall of level is indicated by the somewhat shallower Shire River, where the Nyassa waters enter it.

In the northern part of Nyassa, where the coasts are bordered by high mountains, Lieut. Gurney has recently made a line of soundings where no bottom was found at 1,800 feet, the length of his wire. Between these highlands, therefore, is found an unusual depression, the bottom of the lake being certainly more than 300 feet below the level of the sea, as its surface is 1,500 feet above it.

Mr. W. H. Nutt, whose account of his journey to Lake Rutwa, east of the southern part of Lake Tanganyika, in 1894, appeared in the *British Central Africa Gazette* (Oct. 15 and Nov. 1, 1895), likens the lake to a gigantic mud hole. The lake is very shallow for some distance from the shore, appears to be shrinking both in

its northern and southern parts, and apparently receives few important feeders. The large evaporation caused by the burning tropical sun is at present certainly larger than the water receipts.

WILL THE AFRICAN NATIVES WORK FOR HIRE?—Mr. Alfred Sharpe, in his paper in the *Geographical Journal* (1896, April), says, the theory that the negro in tropical Africa cannot be induced to work regularly, except by force, is completely contrary to experience in the Shire Highlands, Lake Nyassa. At first there is a scarcity of native labor until the natives gain confidence in the new settlers. Then there is a flocking in of persons who desire to work. After a time many begin to acquire trades, such as carpentry, brickmaking and bricklaying, or learn skilled work such as timber sawing, overseeing, bullock driving and so on. The brighter men see that such occupations involve less hard work and command higher wages than mere unskilled labor. The news spreads that calico and other highly prized articles may be earned, and every year natives come in from more distant districts to obtain unskilled work.

These persons agree to work for six months, and at the end of that period they go home to till their land and use their earnings. At Blantyre the same men return again and again in succeeding years. So far from there being a scarcity of labor in these regions, more laborers at times come to Blantyre for work than can well be utilized. The natives are now living in better houses, they clothe themselves in calico and prints instead of in bark cloth and skins, they have founded permanent settlements around the white stations, native agriculture has increased and some natives in the Blantyre and Zomba districts are now cultivating coffee and wheat. Large numbers of children attend the schools and many can now read and write.

THE CONGO RAILROAD.—After a year spent in preliminary studies for the Congo railroad, before work was begun, the engineers reported that it might be built for $5,000,000. The commission which has recently inquired into the present condition and prospects of the work has reported that the total cost will be from $12,000,000 to $13,000,000, according to the time taken to finish it. This illustrates again the general rule that the cost of large engineering works, involving new problems, or carried out in new countries, is likely to be greatly underestimated at first.

In May the Belgian parliament voted an immediate loan of

$1,000,000 and guaranteed a further loan of $2,000,000, which practically insures the success of the enterprise. *Le Mouvement Géographique* (Nos. 9 and 13, 1896) says the line was open to Kimpesse, about 100 miles from its starting point at Matadi, and it was expected to complete it to Tumba, 116 miles, before August 1. This is about half way to Stanley Pool, and the engineering works still to be carried out are not of a difficult nature. The commission has reported favorably on the condition of the part of the line now open, and the progress making. The line should be completed, it is thought, by 1900.

An American Naturalist in Africa.—Mr. D. G. Elliot, the American naturalist, left London for Somaliland on March 27 to obtain a series of antelopes and other large African mammals for the Field Columbian Museum of Chicago. From Berbera, on the Gulf of Aden, he expected to travel southward over the high plateau to the Shebeyli River, where he hoped to find giraffes and Grévy's zebras. He will try to return to the coast by the valley of the Jub River, where he will look for the newly-described Hunter's antelope (*Damaliscus hunteri*). Besides his native party he has with him a London taxidermist and Mr. Dobson, who accompanied Dr. A. Donaldson Smith in his recent expedition to Lake Rudolf.

Mount Kenia.—The Geographical Journal for May has a brief letter from the British agent at Zanzibar reporting that Dr. Kolb, a former member of the ill-fated Freeland Expedition into East Africa, has returned from Mount Kenia and asserts that he has ascended it to its summit, from the upper waters of the Tana. The letter contains no particulars of the ascent nor information concerning the mountain, which is believed to be the second highest in Africa. Dr. Kolb says the people who inhabit and cultivate the slopes of Kenia have no common tribal name or government and are quite distinct from the tribes at the base, though speaking a dialect resembling that of the Wakamba.

The Future of Eritrea.—Baron L. Franchetti's lecture before the Second Italian Geographical Congress on the development of Italy's Colony on the Red Sea (*Scottish Geographical Magazine*, April, 1896) has scant praise for Massowah, the port, and its neighboring lowlands, which as yet offer few opportunities for trade or agriculture. The plateau, however, with a mean elevation of 6,500 feet, has a mild and healthful climate, a large proportion of cul-

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tivable lands and abundance of water. Cereal and leguminous plants, the vine, olive and other fruits thrive, and agriculture may profitably be carried on. Ten peasant families went to Eritrea from Italy in 1893, each receiving fifty acres of land in the neighborhood of Godofelassi, which has an Italian garrison. Between November, 1893, and July, 1894, each family had cleared fifteen to twenty acres, planted them and the crops promised well. Little outcome can be expected from the lowlands between the plateau and the sea.

ASIA.

PROGRESS IN JAPAN.—Mr. James Troup, British consul at Yokohama, in a paper read before the Scottish Geographical Society in February last, said that although China proper has a population eight or ten times as large as that of Japan, her foreign trade through the open ports does not amount to twice that of Japan. In order to develop the Japanese merchant marine on European models, the government, in 1887, prohibited the building of junks of over ninety tons burden. Japan now owns 517 merchant steam vessels, of which 102 are ocean-going steamers. Japanese companies have established steamship lines from home ports to Shanghai, Corean ports and Vladivostock, and to Bombay; and vessels trade to other ports in the East. Inland transport has been greatly improved by the development of the railroad system. Considerably over 2,000 miles of railroads are now open to traffic, and extensions, now proceeding, will increase the mileage to about 3,000 miles. The industrial development is proceeding apace. The opening of the ports gave an immense stimulus to the production of silk, about half of which is consumed in the country, while the silk export is now worth about $22,500,000 a year. Mr. Troup also showed the impetus that had been given to the cultivation of tea, rice and other agricultural products, and to the mineral, timber and marine industries.

The people are better clad than they were thirty years ago, the uniforms of the army and navy and of civil functionaries have been remodelled in the Western fashion, and the attire of a very great many persons has been similarly changed. The ordinary population continue to clothe themselves mostly in cotton in the old style of dress. The use of goods from the West has inspired the Japanese with a desire to make similar articles for themselves. Considerable attention has recently been drawn to the fact that Japan may become more and more a competitor in supplying the Occident with

goods that heretofore have been manufactured mainly in Europe or America. But Mr. Troup does not think the conditions for competing with the West are so favorable in Japan as they seemed to be a year ago. Food and labor are rising in price and the dearth of labor during the recent war seems to be now accentuated by emigration to Formosa; but in time, Japan is likely to largely supply herself at home with the textile fabrics and the machinery she now imports.

Siberian River Surveys in 1895.—The Russian *Official Messenger* reports that the Siberian hydrographic expedition, last summer, under Colonel Vilkitzki and Lieutenant Ivanoff, was very successful. The expedition left Yeniseisk on June 25, explored the unsurveyed parts of the lower Yenisei, surveyed the eastern shores of Ob Bay, which had been very imperfectly mapped, reached Obdorsk, which is now becoming the centre of the whole region, next entered the Irtysh and went to Tobolsk. Next year the exploration of the Ob will be resumed. The explorers say that the difference between high and low water in the Yenisei, which is nearly three fathoms at Yeniseisk, decreases in its lower course and ceases to be felt in the Brekhovskiye Archipelago. The current, which is five knots an hour in the narrow upper parts of the river, decreases to three-fourths of a knot in its lower course. The lower river may be navigated as far as Turukhansk, 670 miles, without a pilot. With a pilot vessels drawing 21 feet may navigate as far as the rapids, 1,000 miles from the mouth, and in the spring, there is a four-fathom depth nearly up to Yeniseisk. The shoals are wholly along the shores and are now well mapped.

The most important discovery made was that Ob Bay is not so wide as it is shown on the map, and has not the straight direction it was supposed to have. Under 72° N. lat. the eastern coast of the bay suddenly bends to the west and runs for forty-five nautical miles westward. Under the 71st degree it turns eastward again and only then runs due south, the errors of the best maps in the position of the coast attaining as much as 30 to 35 nautical miles.

THE POLAR REGIONS.

Mr. Peary's next Expedition to Greenland.—About July 8, Civil Engineer R. E. Peary, U. S. N., will start on his fourth journey to Greenland. He will visit Cape York, Whale Sound and Cape Sabine to complete in some details the investigations that have so long engaged him. He may be able to extend his survey of

the coast line, already completed from Cape York to Cape Alexander, as far north as Littleton Island. He will also endeavor to enter Jones Sound, which has not been penetrated to any extent since Inglefield's voyage in 1852. If the ice conditions in Melville Bay are favorable he will secure the large meteorite on the north shore of that bay, which he was unable to bring home with him last year, though he secured two smaller specimens. This purpose, however, may not be attained unless he can place his vessel within convenient distance of the shore. He expects to add much material to the fine collections he has already brought home. Mr. Albert Operti, the artist, will go with him and will take casts of the Cape York natives for the purpose of making typical models. On the way home Mr. Peary will probably visit Cumberland Sound and spend a week in Hudson Strait.

Two parties of scientific men will take passage on Mr. Peary's ship and will land south of his field of work to pursue their own investigations. A party of four or five young men from Cornell University, headed by Mr. Ralph S. Tarr, the geologist, will go to the neighborhood of Devil's Thumb, Melville Bay, to make collections and geological and glacial researches. Prof. A. E. Burton, of the Massachusetts Institute of Technology, with four or five comrades, will be landed at Umanak Fiord, Southwest Greenland, where they will make pendulum observations and study glacial characteristics and movement. Both parties will return with Mr. Peary.

S. A. Andree's Balloon Journey.—Mr. Andree, and his two companions, Mr. Nils Ekholm, the Swedish meteorologist, and Mr. Strindberg, expect to start on their air voyage from North-western Spitzbergen late in July or early in August, somewhat later than the date previously mentioned. Mr. Ekholm recently made a long statement in the Swedish press in which he said that the balloon cloth used had been put to the severest test and would sustain a pressure nearly twenty times as great as it would be subjected to, while the escape of hydrogen gas would be so small that the balloon might be supported in the air for a much longer period than the two weeks or less which, he believed, would be the time limit of the voyage.

Some expert aeronauts, as well as many meteorologists, do not share Mr. Andree's faith that the outcome will be fortunate. Herr A. Berson, who has made thirty-five balloon ascents, and who read a paper on "Geography and Ballooning" before the Berlin Gesell-

schaft für Erdkunde on January 7, expressed the opinion that Mr. Andree's expedition is the most hazardous ever undertaken by explorers, and that it has little chance of success. We know nothing of the region, he said, either on the Siberian or the American side, between the Pole and 70° N. latitude, a stretch of 1,350 miles. We know very little about the winds between Spitzbergen and the Pole, but it is apparent that the atmospheric circulation in the belt of moving depressions round the Pole cannot be favorable to a long balloon journey. Herr Berson added that he had found journeys of only 180 to 300 miles with balloons of a volume up to 160,000 cubic feet extremely difficult during rain or snow. He feared that Mr. Andree and his two companions would throw away their lives.

The effect, in decreasing the buoyancy of Mr. Andree's balloon, of his immense spread of cloth, in an atmosphere that is likely to be filled with snow or frost, remains to be tested. It will be remembered that when Mr. Peary was travelling at an altitude of 8,000 feet above the sea a stick stuck in the snow was often thickly covered with frost crystals, on the windward side, in a few minutes. Mr. Peary's wearisome experience with fog also suggests the possibility that Mr. Andree might drift clear across the Polar area without once catching a glimpse of land or the ice-covered sea.

The young Frenchmen, Bissanc and Hermite, planned to start in 1892 in a monster balloon for the North Pole, but the idea was so severely criticised that they did not make the attempt. They looked for encouragement to the Paris Aeronautic Society, but, at a meeting of that body, there was loud applause when the president advised the young men to give up the attempt and declared that there was not one chance in a thousand that such an enterprise could succeed.

WASHINGTON LETTER.

WASHINGTON, JUNE 25, 1896.

Geography and the 54th Congress will be a proper and interesting subject of review. The session just closed was not fruitful of direct legislation which will affect geographical features, but several measures were inaugurated, and some older ones advanced on lines that may modify existing conditions. The subject of internal waterways was prominent.

LAKE SUPERIOR AND MISSISSIPPI RIVER CANAL.—Major Clinton B. Sears of the Corps of Engineers submitted to the Senate a report on a survey for the location of a canal to connect Lake Superior and the Mississippi River, which survey and report had been directed by legislation of a previous session. The intention of Congress was to ascertain which was the most feasible of three indicated routes, viz., by way of either the Saint Croix, Rum, or Upper Mississippi rivers. The question whether either of them was feasible, or whether the commercial benefits to be derived would justify the expenditure involved, was precluded. Consequently Major Sears confined himself to the question which of the three routes was the most feasible. The route via Allouez Bay and Brule and St. Croix rivers was recommended.

It is understood that the intention of the promoters of this undertaking was to provide for a canal from Lake Superior to St. Paul and Minneapolis, but the wording of the act authorizing the examination precluded a survey of any portion of the Mississippi as a connecting link, thus leaving the Mississippi end of the route over 300 miles from St. Anthony Falls. This of itself, however, is not important except as an element of cost.

PUGET SOUND AND LAKES UNION AND WASHINGTON CANAL.—Congress called for the report of Capt. T. W. Symons, Corps of Engineers, upon the survey of the waterway connecting the waters of Puget Sound, at Salmon Bay, with Lakes Union and Washington. The project contemplates making a fresh-water basin out of Salmon Bay, a navigable salt-water body, by raising its waters to, and maintaining them on a level with Lake Union, by means of a

lock at its mouth. It also calls for a lock between Lakes Union and Washington. The general route of the proposed canal or waterway leaves Puget Sound at the mouth of Salmon Bay; traverses the entire length of this bay; thence by a cut to Lake Union; through Lake Union to the eastern extremity; finally entering Lake Washington by a cut across a narrow ridge known as the Portage. The object of the improvement is to further develop the wonderful facilities of the city of Seattle as a Pacific coast seaport, by enabling vessels of all kinds to have access to these lakes and the extensive manufacturing and commercial interests involved.

CANAL FROM THE GREAT LAKES TO NEW YORK.—The Committee on Commerce in the Senate reported favorably on the bill to incorporate the Maritime Canal of North America, which gives in effect, authority to construct and operate a ship canal from the Great Lakes to New York. The course of the canal is around Niagara Falls, thence through Lake Ontario and down the St. Lawrence to a point near the international boundary; thence to Lake Champlain, to Hudson River and the ocean. The channels must be of sufficient width and depth to allow vessels drawing twenty feet of water to pass each other with safety; the locks large enough to admit vessels 550 feet in length and 65 feet in width. The incorporators are well known transportation and business men, engineers, manufacturers and bankers, some of them of large wealth. The bill seeks no appropriation, grant or guaranty from the Government now or hereafter. The privileges sought are extensive and far reaching, because the future greatest growth and development of the country will be in the region of the Great Lakes. Hon. F. A. Flower, Secretary of the International Deep Waterways Association and the recognized head of the deep-water movement, made a highly interesting statement before the Committee, which also forms part of its report.

A clause in the River and Harbor Act of the recent session directs the Secretary of War to prepare estimates for the construction of a ship canal by the most practicable route wholly within the United States, from the Great Lakes to the navigable waters of the Hudson River, of sufficient capacity to transport the tonnage of the lakes to the sea.

NICARAGUA CANAL.—Reports were made to both Houses of Congress favoring the construction of the Nicaragua Canal. The report of the House Committee deals with the canal project from the financial and engineering standpoints, and particularly analyses

the report of the Government Board appointed last year, of which Col. Ludlow was chairman. The feasibility and practicability of the construction having been admitted by the Board, the House Committee insists that the Government should aid the company in the completion of the work even if it costs over $150,000,000, on the ground that while the advantages to be derived by the United States from such corporation are untold, the risk would be practically nothing.

CHESAPEAKE AND DELAWARE BAYS CANAL.—Senator Elkins introduced a bill to provide for the construction of a canal through Maryland and Delaware to connect the waters of the Chesapeake and Delaware bays. The canal to have a depth of 30 feet, and width of 178 at the top and 100 at the bottom; locks of sufficient size to allow the passage of vessels of the largest size in use in ocean traffic. The canal when completed to be a military, naval, postal and public highway.

LAKE MICHIGAN AND WABASH RIVER CANAL.—Senator White made a favorable report on a resolution providing for the appointment of a commission of army engineers to survey and report plans, specifications and approximate estimates of the cost of construction of a ship canal from the lower shore of Lake Michigan to the Wabash River. Such a canal would afford a route from the Great Lakes to the Gulf without breaking bulk.

GROUND MAP OF THE UNITED STATES.—Favorable report was made on a proposition submitted by Mr. Cannon, of Utah, for the appointment of a commission to examine into the practicability, advisability and cost of establishing at Washington a ground map of the United States, on a scale of one square yard of map surface for each square mile of actual area, reproducing in earth and other materials, on scale, the boundaries and topography, and all the natural and artificial features of the surface, showing geographical divisions; also, mountains, hills and valleys, forests, lakes and streams, cities and villages.

To provide a map on the plan and scale proposed would require 625 acres. Upon such a map the Mississippi River with its Missouri tributary would be 4,506 yards long, and about 3 feet wide of actual water. Lake Michigan would contain 22,000 square yards of actual water surface. Mr. Cannon says he has expert testimony to the effect that neither will the cost be extravagant nor any physical difficulties in the way of the production; and that as to the advisa-

bility, there is not an hour in any working day of the year when legislators or administrative officers are not confronted by problems which could be more speedily, more justly, and more intelligently settled by reference to a map of this character.

At all events, considerable service might be rendered to the official knowledge of the country and to popular education by the work of such a commission, embodied in a report.

NAVASSA AND SWAN ISLANDS.—A resolution was under consideration in the Senate directing the Secretary of the Navy to appoint a board of three officers to proceed to Navassa and Swan islands in the West Indies to ascertain the practicability of establishing a coal station on either. These islands are said to have no anchorages, but shores like a stone wall. They are private property, and useful for fertilizing material.

METRIC SYSTEM.—An unsuccessful effort was made to fix the standard of weights and measures by the adoption of the metric system. The use of this system was made legal and permissive by an Act of Congress passed in 1866. That action did not make the system obligatory, but simply legal, permissive by anybody who desired to use it. The object of the present effort was to complete the work commenced in 1866; first, by adopting it in Government work; and then, at the commencement of the new century, to recognize it as the legal system throughout the country. In many of the Bureaus of the Government it is now in operation. In the Coast and Geodetic Survey office it has for years been practically the exclusive system. In other Bureaus it is used to a large extent. In the Post Office Department it is within the power of the Postmaster-General to have every letter weighed by the metric system; for every pound of mail matter placed in the office for transportation to foreign countries is now weighed and its transportation settled by that system.

Mr. Charles W. Stone, Representative from Pennsylvania, presented the subject forcibly in the House of Representatives; but he found it a difficult matter to convince that body that it would be quite as easy for the people to understand and to know that 30 grams make one ounce as that 20 pennyweights make one ounce. It being late in the afternoon of the day that the measure was under consideration, the House was in a mood to be entertained and easily impressed with shallow wit; which situation was taken advantage of by Mr. Otey (of Virginia), who kept the members in "laughter," "great laughter," "renewed laughter" (according to

the official report) by a skilful ridicule of technical and scientific words and phrases. Mr. R. W. Parker, of New Jersey, and Mr. Franklin Bartlett, of New York, were conspicuous opponents. The effort to apply the decimal system to length, capacity and weight, as well as to coins, was delayed for a season.

PACIFIC CABLES.—In the matter of a Pacific cable, Senator Frye made a report favoring its construction and maintenance by any private corporation which shall recognize the Spalding concession, and accept a subsidy of $160,000 per year for twenty years from the United States Government, the cable to extend from San Francisco to Honolulu, and by way of the Midway Islands to such points on the coast of Japan as the company may select. It will be recalled that at the session of Congress preceding the last, the Senate by a decisive vote adopted, and the House by a large minority supported, a resolution directing the immediate construction of a line to Honolulu at the sole expense of the United States.

A bill is pending authorizing M. J. Fahey, of New Haven, and associates to construct and operate a cable and telegraph from the State of Washington to Sitka or Juneau; thence to Saint Paul on Kadiak Island; thence to Ounalaska and some point in the Aleutian group where a connection can be made with the Siberian and Japan telegraph system.

It is the purpose of a bill reported by representative W. H. Doolittle to require every company, American or foreign, to apply hereafter to Congress for permission to land or operate any submarine cable. All cables now in operation have had such permission granted by the Department of State, subject to any future action of Congress; but as a matter of fact there is no law of Congress authorizing the Department to comply with such requests. Nor would a general law on the subject be desirable, because the circumstances surrounding, and the character of each project for laying a submarine cable, are likely to be peculiar to itself.

The Hydrographic Officer has recently issued a chart of the Submarine Cables of the world, principal connecting land lines, and coaling, docking and repairing stations.

COAST SURVEY.—Not long ago the Coast Survey made an effort to secure files of all maps relating to this country, and especially of all that are published by the authority of the States or Counties. The results, as far as the latter are concerned, were very meagre. Ten States sent small railroad maps, of various scales, issued by railroad commissioners, and of but little geographical value, viz.:

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Alabama, Arkansas, Maine, Michigan, Missouri, Nebraska, North Dakota, Ohio, Pennsylvania, and Virginia. Ten States and Territories replied that they had no officially authorized maps, viz.: Arizona, Delaware, Iowa, Louisiana, Montana, Nevada, Oklahoma, Texas, West Virginia, and Alaska. California and New Jersey sent two geological maps. Ohio sent a small map with geological features superimposed. Nebraska sent a statistical map. The grand total being fourteen, from forty-five States and six Territories. Seventeen States made no response whatever; among these Connecticut, Illinois, Indiana, Maryland, Massachusetts and Vermont.

A new edition (the 4th) of the Coast Survey's Formulæ and Tables for the computation of geodetic positions has appeared. It differs from the preceding one by the introduction of a change in the notation of the formulæ, substituting for the older form one better in accord with modern custom, and, further, by an extension of the tables so as to take in the highest latitude of the United States territory, besides 5° added to the former southernmost limit.

The Survey has also issued a second enlarged and revised edition of "Geographic positions of trigonometric points in Massachusetts." These positions were determined between 1843 and 1894, and include also the work of the Borden Survey of 1832 to 1858. The number of stations occupied was 1,467, of which 447 belong to the Borden survey.

The exquisite instruments used by the Coast Survey, many of which are evolutions suggested by the experience of field parties, are constructed in the shop of the Survey. An advisory board, consisting of the most valued officers of the Survey, with the chief instrument maker (Mr. E. G. Fischer), considers all important matters referring to instruments, the aim being to make them as perfect as possible, taking advantage of the experience of all surveys in this as well as foreign countries.

ALASKA, AND ARCTIC REGIONS.—The Coast Survey has given out some new information * relating to the vicinity of Cook's Inlet and region to the westward, and the vicinity of Chatham and Peril straits. The information relating to Cook's Inlet is founded on the investigations made last summer by Prof. Dall, who, in connection with Prof. Becker, made a survey of that region with special reference to coal deposits. The charts of the territory around Cook's Inlet are far from correct, but they are compiled from the

* Bulletin No. 35.

most reliable sources. The Coast Survey is making every effort to have this valuable part of the region accurately charted.

The information covering the vicinity of Chatham and Peril straits from Point Gardner at the junction of Frederick Sound and Chatham Strait, to Povarotni Island in Peril Strait is compiled from notes made in 1895 by Commander E. K. Moore, U. S. N., commanding the Coast Survey steamer *Patterson.* It is very general in its character, and preliminary to the charts and sailing directions which will be published in the near future. Still, the notes are a valuable addition to the scant information already existing in print on this part of Alaska.

The new map of the Arctic regions, with tracks of search parties and the progress of discovery (40 x 40 inches), published by the U. S. Hydrographic Office, delineates the routes of all the explorations of the coasts since 1734. Forty-eight expeditions are indicated, and, in addition, the tracks of seventy-six parties. These tracks are represented in varied colors. Twenty explorations, or nearly half the total, are credited to Russia; nineteen to Great Britain; six to the United States; one to Austro-Hungary; one to Germany, and one to Norway.

The extent of trackage displayed on the European-Asiatic side of the chart, especially in the regions of the Russian possessions, is somewhat surprising. The numerous soundings indicated leave very little room for uncertain navigation. The most interesting study is on the American side of the chart. Here we have a comprehensive and graphic representation of the extensive routes taken by Parry, Franklin (probable), McClure, Collinson, Grinnell expedition, Kane and Hayes, McClintock, Nordenskiöld, DeLong, Lockwood and Brainard, and Peary, and others of less extent. The whole display is a most skilful representation of the progress of discovery and of our present knowledge of the Arctic regions. As nothing like it has been published heretofore, all educators and those interested in Arctic discoveries will appreciate the work of Commander C. D. Sigsbee, under whose direction, as U. S. Hydrographer, this important information has been made available.

The investigation of the gold and coal resources of Alaska commenced last year by Prof. Dall and Prof. Becker will be continued this year by Mr. J. E. Spurr and associates under direction of the Geological Survey. The examination will extend to the Upper Yukon region. The party will not return at the end of the season, but remain through the winter months, continuing the examination through the season of 1897. Prof. Becker, one of the best

gold mine experts in the world, is on an extended leave of absence, and is now engaged in the gold fields of South Africa under liberal arrangements with interested parties.

GEOLOGICAL SURVEY.—The work of surveying the Indian Territory, begun last summer and continued with only a few days' interruption since, is keeping a large force at work. A number of geological and topographical parties have resumed operations in other parts of the country. The appropriations available for the use of the Survey during the season of 1896–97, including the Indian Territory survey, aggregate $736,590.

Mr. Henry Gannett, the Geographer of the Survey, is giving attention to original inquiry on the subject of magnetics, and will during the year prepare several reports on this topic and others connected with physical geography. The work hitherto in charge of Mr. Gannett has been divided. He will hereafter devote himself exclusively to geographical work; the administration of the topographical branch will be under the immediate charge of Mr. Walcott, the Director.

FORESTRY.—The Commission organized by invitation of the Secretary of the Interior with the approval of Congress, for the purpose of making an investigation of various forestry problems, will proceed to Montana in July. From thence the tour will be extended through Idaho, Oregon, Washington, California, Arizona, New Mexico and Colorado.

The Secretary has requested an opinion upon the following points:

1. Is it desirable and practicable to preserve from fire and to maintain permanently as forestry lands those portions of the public domain now bearing wood growth for the supply of timber?

2. How far does the influence of forest upon climatic soil and water conditions make desirable a policy of forest conservation in regions where the public domain is principally situated?

3. What special legislation should be enacted to remedy the evils now existing?

Those composing the Commission are Charles S. Sargent, Alexander Agassiz, Henry L. Abbott, William H. Brewer, Arnold Hague and Gifford Pinchot. Prof. Wolcott Gibbs, President of the National Academy of Sciences, is an *ex-officio* member. Several preliminary meetings have been held. The Commission will return late in the autumn, and as soon as possible thereafter submit its report.

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MAP NOTICES.

Topographic Atlas of the United States.

Since our last notice the U. S. Geological Survey has issued 20 additional sheets. Of these one only, Ticonderoga, is in New York. This is a beautiful sheet, embracing parts of Lakes George and Champlain—a historic region.

In Pennsylvania are two sheets, Norristown and Chester, lying just west of Philadelphia, and containing a large suburban population. These two sheets, with the Philadelphia and Germantown sheets, are to be printed as one map, showing Philadelphia and its environs.

In Georgia is one sheet, Monroe, lying east of Atlanta, in the Piedmont region.

The Dakotas receive special attention in this issue. In North Dakota are four sheets, viz.: Edgeley, Columbia, Jamestown and Lamoure. The last three are in the James River valley and show slight relief, except the little irregularities due to deposits from the continental glacier. On the western part of the Edgeley sheet, however, appears the eastern margin of the Coteau du Missouri, or the "Hills," as locally known. This Coteau, as is well known, is a long tongue of glacial deposits, stretching from Canada down across the Dakotas, between the Missouri and James rivers. On the Edgeley sheet, its bluff edge rises 200 to 300 feet above the James River valley. Its surface is extremely irregular, being a succession of rounded gravel hills, interspersed with ponds, most of which have no outlets. The region is devoid of timber.

In South Dakota there are two sheets, Byron and Aberdeen, both in the level valley of James River.

In southwestern Kansas there is one sheet, Garden, representing the Sand Hill country of that region, a country without order or system, built up from drifting sands.

In western Texas are two sheets, Alpine and Chispa, each representing about 1,000 square miles of broad, flat valleys, intersected by trachyte mountain ranges, irregular in character.

In Wyoming are four sheets. Two of these, Ishawooa and Crandall Creek, are just east of the Yellowstone National Park, and include a large area of the most rugged portion of the Absaroka range. A third, Dayton, includes the head of Tongue River and a

part of the Bighorn Range, until recently an unknown region. The fourth, Laramie, shows a part of the great Laramie Plains.

The San Francisco peninsula is represented on two sheets, San Francisco, which includes the city, and San Mateo, lying just south of it.

Crater Lake, Oregon, is made the subject of a special sheet, on the scale of 1:62,500. This lake, five or six miles in diameter, occupies a crater-shaped depression on the summit of a truncated mountain. The top of the mountain has either been blown out or has sunken. The lake is roughly circular in form, surrounded by cliffs 1,500 to 2,000 feet in height, and has no outlet, and practically no drainage basin, beyond its own area.

A Map of the United States showing the Distribution of Lands. By F. H. Newell.

This map accompanies a report on the Public Lands and Their Water Supply, by Mr. Newell, which forms a part of the Sixteenth Annual Report of the U. S. Geological Survey.

The map shows, by a series of colors, (*a*) The area included in the thirteen original States, with those formed from them, and Texas, in which states the United States has never owned any land. (*b*) Areas which, while formerly held by the United States, have passed into private ownership. (*c*) Land grants to railroads. (*d*) Indian reservations. (*e*) Forest reserves.

The most interesting feature of this valuable map consists in the areas which have been alienated by the Government to private parties. In the Central States nearly all, and in many of them all, the lands have been alienated. The trifling areas still held by the Government in the Gulf and Lake States are scattered in small bodies over those states. In Minnesota there are still considerable areas near the northern boundary held by the Government. In the Dakotas, west of the Missouri River, there are large areas of land still unoccupied. Indeed, most of the northern half of North Dakota is still Government land. In the western part of Oklahoma there are still large areas unoccupied. In the Western States, east of the Cascades and the Sierra, the occupied areas are in the small tracts quite generally scattered over the country and much the larger portion of the land is as yet unoccupied. In eastern Washington there is a large occupied tract, while the entire valley west of the Cascades and the Sierra, from the northern boundary to southern California, is almost entirely taken up. So it is with the strip along the Pacific Coast west of and among the Coast Ranges.

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The dependence of settlement upon water in the arid West is forcibly shown by the location of the settlements, which are found in all cases scattered along the streams.

This report is accompanied by another map which also deserves notice. It is entitled, "The Relative Location of Forests, Woodlands and Irrigated Areas in the Western Part of the United States." Upon this map forests, by which is evidently to be understood areas of woodland, which are of merchantable character, are represented in green, while other woodland areas, such as mesquite, piñon pine, cedar, and quaking aspen, are distinguished from them by a drab color. Irrigated areas are represented in red.

Although highly generalized, being on a scale of 200 miles to an inch, this is doubtless by far the best map showing the distribution of woodlands in the western part of the country, since it represents the accumulation of a vast amount of data. It will doubtless surprise many readers to see the large extent of forests in Arizona, New Mexico, Colorado and Utah, which States are popularly supposed to be devoid of forests of value.

"*Outline Map of the United States and Territories. Prepared in the Office of the Chief of Engineers, U. S. A., Under the Direction of Major H. M. Adams, Corps of Engineers, U. S. A. Showing the Tonnage of the Navigable Rivers of the United States. Compiled from Annual Reports, for 1894 and previous Years. Scale 50 miles to one inch.*"

This map shows graphically, by the breadth of the bands of color, the navigable rivers, and the freight tonnage which was borne upon these rivers in the year 1894. It forms a most graphic summary of our internal commerce upon our rivers.

The heaviest commerce regarded upon this map is that through the Detroit River from Lake Huron to Lake Erie. Most of this comes from Lake Superior, as is shown by the large volume which passes through St. Mary's River, and nearly all of it is dropped at ports upon Lake Erie, mainly at Buffalo, as is shown by the greatly decreased volume which passes the Niagara River and also by the large volume which comes down the Hudson.

Of the freight upon the main rivers of the United States, that upon the Ohio is much the heaviest, greatly exceeding that on the Lower Mississippi. This is explainable by the movement of coal from the neighborhood of Pittsburg to Ohio River points and to St. Louis. We are surprised to see that, while there is considerable freight movement up the Missouri River as far as Great Falls,

Montana and up the Arkansas far into Kansas, there is no movement upon the Yellowstone River, upon the Rio Grande, or upon the Colorado; at least none of magnitude to warrant representation upon a map.

Among the many interesting features which this map develops may be mentioned the course of the fall line from Trenton southward and westward to Montgomery, Alabama, which is here outlined clearly and unmistakably by the extent of navigability of streams.

We are not aware that this method of representing commercial movements has been used in statistical illustration in this country before, and Major Adams is to be congratulated upon his success in applying this method of representation.

Topographical Map of Blue Hills Reservation. Topographical Map of Middlesex Fells.

The scale of the above maps is 1:6,000, or 500 feet to an inch. Relief is expressed by contour lines, with five-foot intervals. Maps are published by photolithography, the year of publication being 1895.

These maps are made from original surveys, under contract with the Metropolitan Park Commission, of Boston, by Messrs. French, Bryant & Taylor. They appear to be most excellent maps and are well worthy of extended notice. The area of these maps was first controlled by triangulation. As required by the specifications, lines were then run by stadia at intervals of two miles in both directions across the areas, along which lines heights as well as distances were measured, and at their intersections stone monuments were set. The filling in of details was done by plane table. The contours were located, in the main, by interpolation between measured heights. In a few cases, especially in the more level country, contour lines were followed.

The original maps were drawn upon a scale of 100 feet to an inch, the published maps, therefore, being a reduction to one-fifth the scale of the original drawing.

The contract price at which the work was done was $1.50 per acre, or about $1,000 per square mile.

Service Géographique des Colonies. Congo Français. Carte dressée à l'Echelle de 1:1,500,000 par J. Hansen, Cartographe du Congo Français, Paris, 1895.

This is in two sheets, on a scale of about 25 miles to an inch. It has been compiled from surveys made between 1867 and 1895,

by nearly a hundred different explorers. It gives the course of the Congo and its main branches on the north within French territory, in considerable detail, but there still remain interspaces of many thousands of square miles which are as yet untrodden by civilized man.

An annexed map shows the region about the mouth of the Congo, and a second annexed map, on a much smaller scale, 1:5,250,000, about 83 miles to an inch, presents the region between Lake Chad and the Nile, *i. e.*, the Western Sudan.

The map shows little besides culture and drainage, relief being but faintly expressed.

A pamphlet describing the sources of information used in the preparation of the map, and containing also an alphabetical index of all names found on the map, accompanies it.

Carte de l'État Indépendant du Congo. Dressée d'après les Itinéraires originaux des Agents de l'État et d'autres voyageurs par J. Du Fief, Secrétaire Général de la Société Royale Belge de Géographie. Echelle 1:2,000,000. 20 Juillet, 1895.

This map, in four sheets, on a scale of about 32 miles to an inch, illustrates, when placed in comparison with those of earlier date, the extreme rapidity with which this dark spot on the face of the earth is becoming illuminated. Half a generation ago this entire area of the Congo Free State was a *terra incognita*, a blank upon the maps. Now there is not an area on this map as large as the hand which is unknown, which has not been penetrated by explorers, while most of the map is a perfect network of lines of exploration.

The progress of the State in establishing stations and thereby obtaining control over the territory has kept pace with its exploration. Hundreds of stations are now maintained, not only along the course of the Congo, but on all its principal tributaries, while many are located in the interior, away from water transportation. One of the most impressive features brought out by the map is the line of stations on the Aruwimi, upon which stream Stanley toiled but a few short years ago.

Mapa Cadastral Gráfico de la Provincia de Corrientes, República Argentina, construido con los datos oficiales por el Agrimensor Zacarias Sanchez, 1893. Scale 1:40,000.

This map, complete in sixteen sheets, shows primarily property lines, as is indicated by its title. It is more, however, than a mere

cadastral diagram, since it represents all cultural and physical features, except relief, in considerable detail.

Schizzo del Teatro della Guerra Italo-Abissina. Edito dall Istituto Cartografico Italiano. Roma, Marzo, 1896. Scala di 1:333,000.

This map, on a scale of about five miles to one inch, represents an area of some 450 square miles in northern Abyssinia, comprising the region in which the Italian soldiers recently received such a crushing defeat at the hands of the Abyssinian forces.

The map represents routes and streams in considerable detail. Relief is expressed by brush shading, and the mountainous nature of the country is well developed. It is an ideal region for defensive warfare, especially by active, aggressive warriors, such as the Abyssinians.

Mappe of the Principal Voyages and Discoveries made by the Hollanders, with the principal Lands, Places and Factories in their possession. Brought together by Mr. Anton Mensing, Published by the Committee for Old Holland, at Amsterdamme, 1895.

This is an outline map of the earth, on Mercator's projection, in imitation of the maps of the 15th century, showing the routes of Dutch navigators and discoveries made by them in the days when the world was young.

A study of this map shows that the Dutch, at that time one of the leading commercial nations, played no mean part in exploration. In developing our knowledge of the East Indies they were probably the most prominent of all nations, while to our acquaintance with the coasts of Africa and South America they contributed a considerable share.

The borders of the map are embellished with landscapes and symbolic cuts, as was the fashion three or four centuries ago.

Neue Special-Karte der Südafrikanischen (Transvaal) Republik, des Oranje Freistaats und der Angrenzenden Gebiete. Massstab 1:3,000,000 Nach Afrikanischen, Englischen, Deutschen, Holländischen, Portugiesischen und Französischen Quellen bearbeitet von A. Herrich. Glogau, Verlag von Carl Flemming.

The interest aroused all over the world by Dr. Jameson's raid, and the resulting European and South African complications, make this map of the greatest interest.

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Plano General del Camino Central del Perú del Callao al Ucayali, siguiendo las vias de La Oroya, Chanchamayo y El Pichis, por J. Capelo, 1895. Escala de 1:1,000,000.

This map represents, in some detail, a section across the Andes from Callao to the head of navigation on the Ucayali, a branch of the Amazon. From Callao to Oroya this route is traversed by the railway, thence to Bermudez, on the Pichis, by a wagon road.

A profile accompanies the map, from which it appears that the greatest elevation on the route is 4,950 metres, about 16,000 feet, at the summit of the Cordillera, on the railroad. The terminus of the road, Bermudez, on Amazon waters, is at an elevation of about 700 feet.

Carta Stradale ed Industriale delle Provincie di Macerata,—di Massa e Carrara,—di Ascoli Piceno. Scala 1:500,000. Istituto Cartogrdfico Italiano-Roma.

These three little maps evidently form part of a series, published by the Direzione Generale della Statistica, illustrating the distribution of population and industries of Italy. The population and the prevalent industries of places are indicated by conventional signs.

Provincia de Angola. Carta dos districtos de Benguella, e Mossamedes, 1895. Escala 1:1,000,000. Commissão de Cartographia, Lisboa.

This map, in four sheets, represents, on a scale of about 16 miles to an inch, most of the Portuguese possessions in West Africa. Streams are printed in blue, those which have been explored being in full lines, and those whose course is hypothetical being dotted, and it is surprising to note how large a proportion of this country has been explored. Relief is shown by brown hachures.

Commissão de Cartographia, Lisboa. Costa Oriental de Moçambique. Reconhecimento hydrographico da Barra do Rio Licungo (M'Gondo). Escala 1:10,000, 1895.

Photolith.

Chart of the entrance to the Licungo, in the Portuguese possessions in southeast Africa.

Carta del Teatro della Guerra Nel Sudan Egiziano, tratta dalle migliori e più recenti carte militari inglesi per cura dell'Istituto Cartografico Italiano. Scala, 1:2,000,000. Aprile, 1896.

This map, on a scale of about 32 miles to an inch, represents the scene of the recent disastrous military operations of the Italian

army. It shows the country from the latitude of Suakin on the north down to 9° north, and from the Red Sea westward to the Nile, at Wadi Halfa, thus including much of Abyssinia and the Eastern Sudan. Relief is expressed by crayon shading.

The region here shown may become the theatre of important events in the near future.

The Arctic Regions, with tracks of search parties and the progress of discovery, U. S. Hydrographic Office, 1896. Polar projection extending south to latitude 63°.

Routes of exploration are shown by lines of different kinds and colors, no fewer than 76 expeditions being thus distinguished. Colored bands along the coast indicate the source of original information regarding them.

It is a very comprehensive map, illustrating in the tersest way the progress of Arctic exploration. It would have been an improvement if the same color of lines and bands had been used for expeditions of a certain nationality, or for expeditions between certain dates, so that classifications of the work would be apparent.

BOOK NOTICES.

The Geographical Society of the Pacific. An Examination into the Genuineness of the "Jeannette" Relics. Some Evidences of Currents in the Polar Regions. Report of the Special Committee appointed by the Council to Report upon the "Jeannette" Relics. 8vo. San Francisco, 1896.

This examination and report were made necessary by Prof. W. H. Dall's statement * that the *Jeannette* relics were not genuine, but the result of a trick played by some persons of the U. S. Greely Relief Expeditions of 1883 and 1884.

The relics in question were found on an ice-floe on the 18th of June, 1884, not far from Julianehaab, in South Greenland. The *Jeannette* sank near the New Siberian Islands on the 13th of June, 1881.

In August, 1884, the Danish Consul of New York received the following official communication:

THE COLONY JULIANEHAAB, in South Greenland, June 23d, 1884.

To the Consul for Denmark, at New York:

I hereby take the liberty to request the Consulate to inform the editors of the *New York Herald*, that on the 18th inst. three Greenlanders picked up on an ice-floe some effects and some partly-torn papers belonging to the American Arctic Expedition, among which are the following:

1.—Two end pieces of a wooden box, on which are written with lead pencil—on one piece—

General Orders.	*Ship's Papers.*
Telegrams.	*Various Agreements.*
Sailing Orders.	*Charter Party.*

the last words are not very plain.

2.—On the other piece was—

Before Sailing.

3.—A torn check book. On the back of one of the checks is printed, "For Deposit with the Bank of California."

4.—A pair of oilskin trousers, marked "Louis Noros."

* Fully set forth in a paper in *The National Geographic Magazine* for March, 1896, pp. 93–98.

These effects, numbering twenty-one pieces (besides the papers), are in my possession. I am going home to remain during the winter. Should anybody want further information the same can obtain it by addressing—

KOLONIBESTYRER C. LYTZEN,
Kongl. Grönl. Handels-Kontor,
Kjöbenhavn, K., Denmark.

Respectfully,
CARL LYTZEN.

These relics were placed in the hands of a member of the Danish Geographical Society, at Copenhagen, for safe keeping. The custodian died, his house was taken by another owner, and the relics disappeared.

Prof. Dall's strongest point is that Dr. Emil Bessels, in 1885, interviewed a number of the seamen and officers of the Relief expedition, and made notes of his examinations to the extent of forty or fifty pages of foolscap. The testimony of these seamen was, in brief, to the effect that the presence of *Jeannette* survivors in the Relief expedition had suggested the possibility of the hoax, which was carried out with no intention of serious deception. No names were mentioned and no particular man was personally cognizant of the act.

On one or two occasions Prof. Dall was invited to be present when some of the seamen called on Dr. Bessels. The notes taken by Dr. Bessels were burned with his house at Glendale, D. C., and he himself died in Germany in the year 1888. It does not appear that the notes were ever copied.

Prof. Dall says that his opinion as to the character of the relics was asked and made known to Dr. Nansen before his departure on the voyage from which he has not yet returned.

The Committee appointed by the Geographical Society of the Pacific ask, very properly, why neither Dr. Bessels nor Prof. Dall ever informed the Government of the seamen's testimony concerning the fictitious character of the relics.

The recorded drifts of vessels and trees and other material to the Greenland coast must be held, the Committee argue, to establish the existence of the Arctic currents which brought the *Jeannette* relics to Julianehaab.

The story of the hoax is rejected, as improbable in itself, and as constituting a reproach to the officers of the United States Navy.

With the return of Dr. Nansen it cannot fail to become known how far he was influenced in the formation of his plans by his belief in the genuineness of the *Jeannette* relics and their drift through the Arctic Ocean; but the main question will be left with-

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out a definite answer, though it must be said that the facts, so far as known, and the probabilities support the Committee in their position.

Through Jungle and Desert. Travels in Eastern Africa. By William Astor Chanler, A.M. (Harv.), F.R.G.S., Honorary Member of the Imperial and Royal Geographical Society of Vienna. With Illustrations from Photographs taken by the Author, and Maps.

"*When I travelled I saw many things; and I understand more than I can express.*"—ECCLESIASTICUS, *xxxiv. 11.*

8vo. New York, Macmillan & Co. London: Macmillan & Co., Ltd. 1896.

This volume is the record of two years' work in East Africa, undertaken for the purpose of adding something to the world's knowledge of the country lying between the Tana and Juba rivers. Mr. Chanler had some previous experience of African travel, and his companion, Lieut. von Höhnel, was with Count Teleki on the expedition which resulted in the discovery of Lakes Rudolf and Stephanie. The plan of campaign was to ascend the Tana River to the limit of navigation, and from that to push as far as possible into the interior to the country of the Rendile, a tribe supposed to range between Lake Stephanie on the north and Mt. Kenia on the south, and reported to be rich in flocks and herds. From these people, if he found them, Mr. Chanler hoped to purchase fresh pack-animals and then to continue his explorations.

This plan was carried out, so far as the Rendile were concerned. They were encountered at a point about 100 miles to the northeast of Mt. Kenia. They are described as a tall, thin race, reddish brown in color, with soft, straight, closely cropped hair, regular and almost Caucasian features and fierce blue eyes. Their arms were bows and arrows and spears, and they seemed to be able to defend themselves against their predatory neighbors. The original home of the tribe was the district between the General Matthews Range and Lake Rudolf.

Each Rendile village is governed by a chief, who is elected by his fellows. Polygamy prevails, and with it primogeniture, though substantial presents are given to the brothers of the heir, who also assumes the care of his mother and sisters. When the sisters are married the goods paid for them become the property of the head of the family.

When a man dies the body is shaved and buried in a sitting

posture in a deep hole. The hole is then filled with stones, piled several feet above the ground so as to form a cairn, in the middle of which a spear is fixed in an upright position. The kindred of the dead man then kill a camel and make a feast for their friends. The whole village goes into mourning, and while this lasts ornaments are removed, or if worn, covered with skins.

The food of the Rendile is milk, meat, blood and the fruit of the doum palm. They eat no game but the giraffe and the antelope, and these they hunt on horseback.

It was not long after leaving the Rendile encampment that Lieut. von Höhnel, while engaged in hunting, was charged and seriously hurt by a rhinoceros. This accident practically put an end to the work of the expedition. Lieut. von Höhnel was carried in a litter down to the coast, and Mr. Chanler, left to struggle with failing health, and seeing his caravan melt away by daily desertions, found himself obliged before long, to follow his disabled companion.

Mr. Chanler has described at length the composition of his caravan and the incidents of the long journey from the arrival at Zanzibar to the parting with his Somali and Sudanese at Aden. The scale is somewhat too large for the achievements, but the picture is interesting and animated. The monotony of palavers with native great men was varied by an occasional fight, and by seizing every opportunity for bagging game, quite as much for the sake of sport as to procure food. Mr. Chanler believes in sport. He says, on page 76:

> It is not for sport alone that one shoots in that country; though it is safe to state that the desire to slay is generally present in every fully developed and vigorous man.

If this means that the lower instincts exist in the natural man, it is a commonplace; but if it means that the desire to slay is a distinctive mark of manliness, it is a mistake. Were it otherwise, the accepted type of fully developed and vigorous manhood would be the butcher.

Besides the Rendile, Mr. Chanler discovered the Chanler Falls on the Guaso Nyiro River, a new species of antelope, the *Cervicapra Chanleri*, and a number of new insects. The collections made by himself and Lieut. von Höhnel are now in the National Museum at Washington.

The numerous illustrations are of no great merit, but the maps are fine specimens of skilled workmanship.

Mr. Chanler dedicates his book to Judge Charles P. Daly, President of the American Geographical Society.

Leçons de Géographie Physique, par Albert de Lapparent, professeur à l'École Libre de Hautes Études, ancien Président de la Commission Centrale de la Société de Géographie. Ouvrage Contenant 117 figures dans le texte et une planche en couleurs. Masson et Cie., Éditeurs Libraires de l'Académie de Médecine, 120 Boulevard Saint-Germain, Paris, 1896. 8vo.

This book does not pretend to be a *Treatise* on physical geography. It is to be regarded, in the author's words, as a kind of bridge between the two sciences, geography and geology, including of the latter only what seems strictly necessary and never omitting from the study of the present forms the consideration of the past which has produced them.

An alternative title suggested is: *Lessons on the Genesis of Geographical Forms*, and M. de Lapparent admits that, if he had been writing in America, he would not have hesitated to adopt the word *geomorphogeny*, which first saw the light in this country. Correctly formed as the word is and useful as it may be, there are many among M. de Lapparent's readers who will not regret its absence from the lucid pages to which the new vocabulary has contributed a part of its luxuriant growth.

In the first fifteen lessons M. de Lapparent discusses the definition of the subject, the figure and dimensions of the earth, the relief of its crust, the general conditions and the special forces which have fashioned the surface and the forms, the cycles of erosion, the action of the ice, the winds, and the waters of the ocean, and the incomplete palæographical record, not less difficult to read than a book which has lost the greater part of its leaves.

The physical constitution of Europe is explained in five lessons. Then follow, in succession, the Mediterranean region from Italy east to the Caspian, and south to the Atlas Chain, the little-known Asiatic lands, the Indo-African platforms, North America, Central America and the Antilles, South America, and the Polar Regions.

This rapid sketch of the globe embodies the results of the latest investigations and is drawn with the sure hand of a master.

The illustrations could not well be improved.

The Continent of America, Its Discovery and Its Baptism. An Essay on the Nomenclature of the Old Continents. A Critical and Bibliographical Inquiry into the Naming of America and into the Cosmography of the New World; together with an Attempt to establish the Landfall of Columbus on Watling Island, and the subsequent Discoveries and Explorations on the Main Land by Americus Vespucius.

By John Boyd Thacher. 4to. New York, William Evarts Benjamin, 1896.

Mr. Thacher says in his Preface:

> The chief purpose of this book is to establish the time and place of the naming of America. Baptism suggests birth, and the naming of America leads us back to its discovery. To speak of Vespucius is to tell of Columbus, and we have thus been persuaded by the association and sequence of important events to follow the first voyage of Columbus, the discoverer, and the first voyage of Vespucius, the explorer, and to determine with some degree of certainty the landfall of each.

Mr. Thacher has performed a labour of love in following the discoverer and the explorer, but it does not appear that he has added anything to what was already known about them, although he formally marks at the end of each chapter the stage of progress in the recital of an old, familiar story. Something more than this was to be expected of a writer who introduces us, in his title-page, to the *Cosmography* of the New World; but

> Oft expectation fails, and most oft there
> Where most it promises.

Style redeems all shortcomings, but our author has not the magic gift of style. Columbus is for him (p. 7) one of the few giant figures of the world, standing to-day as he will stand forever, great, grand, colossal.

Mr. Thacher hopes (p. 19) that he has prepared the way for self-congratulation in the hearts of Americans, since, not only do they know for whom their world is called, but the very day and hour of its baptismal ceremony, and he pushes sentimentality beyond bounds when he takes leave of Vespucius (pp. 256–257):

> And now we leave the reader at the door of the temple in which, close to the statue of Columbus, we have seen that of Vespucius firmly established. . . . Under our eyes the story of his travels has come to the little mountain town in Lorraine, and we have heard in that quiet spot the solemn words of baptism with which the *novus mundus* was given his name. . . . We have seen in this book of Ortelius the acceptance of the New World into the sisterhood of four continents, a co-heiress to the glory of the earth. Not in all these things have we had one unworthy thought of Americus Vespucius. Having followed him not afar off, but hand in hand, we feel we know something of him and of his work, and as Columbus, his friend, commended him to his son Diego, so we can confidently and with honest praise commend him to you, O reader, and to the world.

The illustrations and maps in this stately volume are satisfactory reproductions. They include some not previously accessible and a few pictures of St. Dié, the Baptismal Font of America, as Mr. Thacher is pleased to call it.

The book is printed by the DeVinne Press, and it would be difficult to produce in any part of the world a more beautiful specimen of work.

Observations Météorologiques sur les Pluies Générales et les Tempêtes. Nouvelle Edition par Gaston Féral. Montauban, 1896.

In this pamphlet M. Féral describes an electro-magnetic phenomenon observed under the following conditions:

On the 10th of June, 1893, at the village of Puicelcy, arrondissement of Gaillac, we saw in clear weather at six o'clock in the evening, clouds rising on the horizon to the northeast, greenish yellow in their upper part and of a clear, bright red below. They showed themselves at first in circles on the same horizontal line, filling a broad space and rising not quite half the distance to the zenith. Then the circles disappeared and with them the colour of the upper part, and the clouds took a shape resembling a broad horizontal band coloured more or less deeply red. Two hours after their appearance they were no longer to be distinguished. The weather remained fine during the 11th, 12th and 13th of June, with some cirrus clouds, and a south wind.

On the morning of the 14th the sky was overcast, and at one o'clock the rain fell, the wind blowing from the west. It rained, with intermissions, for two and a half days, and the meteorological bulletins showed that the rain had been general.

According to this there exist one or several atmospheric phenomena which show themselves about 91 hours in advance in the districts in which begins the gathering of heavy rains. We have not observed the phenomenon in the winter.

M. Féral concludes that he has made the discovery of an electro-magnetic phenomenon *sui generis*, which may be regarded as a transition between the polar aurora and the electrical discharge of a storm, and he enlarges upon the value of the discovery to the farmer and the cultivator. These persons, it is to be feared, will continue to prefer their own time-honoured science of the weather, when they read M. Féral's admission (on p. 12) that they cannot expect to see his phenomenon more than once a year.

The New Geography. By Albert Perry Brigham. (Reprint), 8vo, 1896.

Prof. Brigham's paper considers the claim of the new geography to a place in the scheme of higher education. It offers, we are told, multiplied sources of intellectual satisfaction and ennobling means of recreation and culture, and it illumines historic and economic research at every turn. This is not too much to say, but Prof. Brigham finds, on comparing the catalogues of fifty American colleges and universities, that thirty-three of these documents afford no reason to suppose that geography receives systematic attention in their respective institutions. Of the remaining seventeen Harvard and Chicago give the fullest measure of instruction and wholly of the most progressive type; Yale has two courses in physical geography, Princeton two, Cornell one, and Michigan teaches the development of topography under geology. Physiog-

raphy is taught in Vassar, Hamilton, Rochester, Wesleyan, and North Carolina. Leland Stanford, Jr., has a course in topographic geology, and Oberlin a course in quaternary geology. At Amherst the subject is briefly treated with historical geology and at Colgate seminary and field courses are given in the history of topography and in glacial geology.

Prof. Brigham quotes with approval the statement that

> systematic study of topography is largely American, and for the reason that the broad object lessons of the Appalachians and of the West gave our scholars the opportunity and the stimulus to lead in such researches.

The statement may or may not be correct, but the reason assigned for it will not bear examination. America is not the only country which offers broad object lessons in topography.

Annuaire Géologique et Minéralogique de la Russie, rédigé par N. Krichtafovitch, Vol. I, livr. I (première moitié). 4to. Varsovie, 1896.

This is the French title of a publication in two languages (Russian and French, or Russian and German), issued as an experiment by the editor, who resides at Novo-Alexandria (Government of Lublin) and has his printing done at Warsaw.

The purpose of the *Annuaire* is to furnish a clear and concise account of every new work on the geology and mineralogy of Russia. The volume for 1896 will consist of about 480 pages, and the second section will be exclusively dedicated to the literature of 1895. Besides notices of 182 books and articles, the present number contains memoirs and original notes and news of scientific expeditions and journeys.

The subscription to the *Annuaire* for 1896 (2 livraisons) is, for the countries of the Postal Union, 12 francs.

Staten Island Names. Ye Olde Names and Nicknames. By William T. Davis, with Maps by Charles W. Leng. Published by the Natural Science Association, New Brighton, Staten Island, N. Y. Price Fifty Cents. The Standard Press: New Brighton, N. Y., 1896. 8vo.

The object of this publication is to record the once well-known names of Staten Island, now mostly forgotten.

The list is not supposed to be complete, though the author has searched through many documents and has gathered information from the inhabitants in his rambles through the island. Even if

incomplete, such a work is useful, and the *Natural Science Association* have done well to print it.

The arrangement is by subjects: *Points and Coves*, *Necks*, etc., but without regard to alphabetical order, so that in consulting the book every entry in a particular section must be read. The Dutch names are less numerous than might be expected, though some forms, apparently English, are no doubt corruptions or translations of Dutch originals.

In many cases Mr. Davis has given the history, or what is locally accepted as the history, of the names.

In the map, which is on the scale of 1¾ inches to the mile, the old and the new names of places are printed side by side.

L'Heure Décimale et la Division de la Circonférence. Par Henri de Sarrauton. Oran, 1896. (*Société de Géographie et d'Archéologie de la Province d'Oran.*)

M. de Sarrauton calls attention, at the beginning of his scientific paper, to this shocking anomaly: Time is measured by hours, which belong to the duodecimal system; by minutes and seconds, which are sexagesimal; and by decimal sub-multiples of the second, the use of the thirds having been abandoned.

The division of the circumference into 360 degrees presents the same inconveniences.

The author recognizes the fact that the decimal numeration is not by any means the best that can be employed, and that two others, at least, are to be preferred to it; the duodecimal, with 12 for its base, and the sexadecimal, with 16 for a base.

He admits the possibility that, in four or five centuries, the decimal numeration may give way to the duodecimal, and that this in its turn, if humanity continues its progressive evolution, may in four or five thousand years give way to the sexadecimal. For the present, however, the decimal system is in force, and the problem is how to extend it to the measurement of time and of angles.

The division of the day into 24 hours antedates history and prevails over all the earth. A day of 20 hours, or one of 10 hours, is not to be thought of, though the latter, employed by Laplace in his *Mécanique Céleste*, was actually ordained by a decree of the National Convention.

M. de Sarrauton establishes two premises:

1.—We are obliged to accept the decimal numeration, although it is not the best possible, because it is admitted throughout the world.

2.—And we are obliged to accept the division of the day into 24 hours for the same reason, and also for another, because it is excellent.

It follows that, in order to apply the decimal system to time, the hour must be taken as the unit, divided into 100 minutes, and each minute divided into 100 seconds. The hours would be counted, in this rearrangement, from 1 to 24.

As regards the measurement of angles, M. de Sarrauton would simplify it, after analyzing the two divisions of the circumference now in use (that of 360 degrees and that of 400 degrees), by the division into 240 degrees. This reform, so far as the purposes of the navigator and the geographer are concerned, may be regarded as perfect. The taking of the longitude becomes a simple matter, as this example shows:

The longitude of Gorée, in time, west of Paris, is 1h. 17m. 59s. Translated into decimal time, this becomes $1^{h}.299,721$. Multiplied by 10, it gives $12°.9572$, the longitude of Gorée in the division into 240 degrees.

The Oran Geographical Society has adopted the conclusions of this logical paper and invites the cöperation of other geographical societies in advocating the proposed reform.

La Découverte du Pôle Nord. Par Eugène Payart. (*Extrait des Comptes-rendus du Sixième Congrès International de Géographie tenu à Londres en Juillet, 1895.*) *Reprint.*

M. Payart's plan, evolved from long study of the history and the conditions of Arctic exploration, recommends itself by its simplicity and its international character. It contemplates the despatch of simultaneous expeditions through two consecutive years, from several nearly equidistant points of a circle, towards the north pole as a centre.

These expeditious to be supported by international contributions.

The farther north they went, the nearer would the exploring parties be to each other for support, in case of need, the distance between the meridians decreasing with the approach to the pole. This distance, which in 75° latitude is 15.5 geog. miles, is only 10.4 miles in latitude 80°, 5.2 miles in latitude 85°, and 3.1 miles in 87° latitude.

M. Payart indicates the following points of departure:
Jan Mayen, or the northern coast of Norway.
Kara Strait, or the mouth of the Petchora or Yenisei.
The mouth of the Lena.
Wrangel Land, or Bering Strait.
Cape Bathurst, or the mouth of the Mackenzie.
A port in Baffin's Bay, on the coast of Greenland.

Six expeditions—one for each point—are proposed, as follows;

A Scandinavian.

An Anglo-Canadian.

An American.

A Russo-Siberian.

A Germanic (Germany, Austria-Hungary and the Netherlands.)

A Western, or Latin (Belgium, France, Portugal, Spain and Italy).

The starting points to be united with the established telegraphic systems, so as to maintain communication with each other and with the world.

The estimated expense of this plan for each expedition is $2,000,000—not including the telegraphic extension.

ACCESSIONS TO THE LIBRARY.

April–June, 1896.

BY PURCHASE.

Dictionary of National Biography, edited by Sydney Lee, Vol. 46, London, 1896, 8vo; Minerva, Jahrbuch der Universitäten der Welt, herausgegeben von Dr. R. Kukula und K. Trübner, Vols. 1, 1891–92, to 5, 1895–96, 8vo, Strassburg; Annual American and English Catalogue, 1895, New York, 1895, 8vo; Plan de Paris, Hachette et Cie., Paris, 1896, 8vo; Le Maroc Inconnu, 1ère Partie, Exploration du Rif (Maroc Septentrional) par Auguste Mouliéras, Oran, 1895, 8vo; Travels amongst American Indians, by Lindesay Brine, Vice-Adm., London, 1894, 8vo; Report of the Commissioners on the New York and Connecticut Boundary, Diagrams, etc., April, 1857, Albany, 1857, 8vo; A History of Jefferson County, in the State of New York, by Franklin B. Hough, Albany and Watertown, 1854, 8vo; A Topographical and Historical Description of Boston, by Nathaniel B. Shurtleff, Boston, 1871, 8vo; Old Streets, Roads, Lanes, Piers and Wharves of New York, by John J. Post, New York, 1882, 8vo; Atlas of the Entire City of New York, G. W. Bromley & Co., New York, 1879, 4to; Atlas of the Entire City of Brooklyn, G. W. Bromley & Co., New York, 1880, 4to; Atlas of Westchester County, New York, G. W. Bromley & Co., New York, 1881, 4to; Expédition dans les Parties Centrales de l'Amérique du Sud, par Francis de Castelnau, Paris, 1850–1857, 6 Tomes, 8vo, 5 Tomes, 4to, Atlas et Planches, 1 Tome, folio; Special-Karte der Südäfrikan. (Transvaal) Republik, A. Herrich, Glogau, 1896; L'Empire des Tsars et les Russes, par Anatole Leroy-Beaulieu, Paris, 1886–90, 3 Tomes, 8vo; Korean Games, with Notes on the Corresponding Games of China and Japan, by Stewart Culin, Philadelphia, 1895, 8vo; A New History of the Conquest of Mexico, by Robert Anderson Wilson, Philadelphia, 1861, 8vo; Une Expédition avec le Négous Ménélik, Vingt Mois en Abyssinie, par J.-G. Vanderheym, Paris, 1896, 8vo; A Narrative of the Early Life and Services of Capt. D. Macdonald, I. N., etc., Weymouth (1842?) 3d Edition, 8vo; Map of Louisiana, W. Darby, Philadelphia, 1816; A Lecture on Switzerland, by W. Longman (London), 1857, 8vo; Reise durch einige der mittlern und südlichen vereinigten nordamerikanischen Staaten nach Ost-Florida und den Bahama-Inseln,

u. s. w , von Johann David Schöpf, Erlangen, 1788, 2 Bde. 8vo; Über den gegenwärtigen Zustand der Hudsonsbay, u. s. w., Eduard Umfreville, herausgegeben von E. U. W. Zimmermann, Helmstädt bei Fleckeisen, 1791, 8vo; Atlas Marítimo de España, D. Vicente Tofiño de S. Miguel, Madrid, 1789, folio; Review of the History of Medicine, by Thomas A. Wise, M.D., London, 1867, 2 vols. 8vo; Commentary on the Hindu System of Medicine, by T. A. Wise, M.D., Calcutta, 1845, 8vo; The Thames, Oxford to London (Owen J. Dullea), London, 1882, 4to; A New Atlas of France: Comprising Maps of the eighty-three Departments, etc. (John Wallis), London, 1794, 4to; Memoirs of Hans Hendrik, the Arctic Traveller, etc., Translated by Dr. Henry Rink, Edited by Prof. Dr. George Stephens, London, 1878, 8vo; Narrative of a Journey through the Province of Khorassan and on the N. W. Frontier of Afghanistan in 1875, by C. M. Mac Gregor, London, 1879, 2 vols., 8vo; The Atrocities of the Pirates, being a Faithful Narrative of the Unparalleled Sufferings endured by the Author, etc., by Aaron Smith, London, 1824, 12mo; An Itinerary of Provence and the Rhone, 1819, by John Hughes, London, 1822, 8vo; Around the Roman Campagna, by George E. Thompson, Liverpool, 1893, 8vo; Memoirs of George Barrington (George Barrington), London, s. a., 8vo; Travels and Adventures of an Orchid Hunter (in Colombia), by Albert Millican, London, 1891, 8vo; A Description of Europe and the Voyages of Othere and Wulfstan, written in Anglo-Saxon by Alfred the Great, translation and Notes by the Rev. Joseph Bosworth, London, 1853, 4to; Studj Biografici e Bibliografici sulla Storia della Geografia in Italia, Vol. II., per G. Uzielli e P. Amat di S. Filippo, Roma, 1882, 8vo; Caerte van de Reysen en de Handel der Hollanders, Amsterdam (1895); Iconografía Española, Coleccion de Retratos, Estatuas, Mausoleos, etc., desde el siglo XI. hasta el XVII., por D. Valentin Carderera y Solano, Madrid, 1855 y 1864, 2 vols., folio; Almanack for the Year 1896, J. Whitaker, London, 1896, 8vo; Archivo del Bibliófilo Filipino, W. E. Retana (Ed.) Tomo Primero, Madrid, 1895, 8vo; Le Congo Illustré, Bruxelles, 1892–1895, 4 vols., 4to; La Turquie d'Asie: Géographie Administrative, Statistique, Descriptive et Raisonnée de chaque Province de l'Asie-Mineure, par Vital Guinet, Paris, 1891–94, 4 vols., 8vo; Topographical Atlas of Rhode Island, U. S. and State Surveys, 1891, Providence, 1891, folio; Die ältesten Weltkarten (Dr. Konrad Miller, ed.), Vols. 2 and 3, Stuttgart, 1895, 4to; I Viaggi di Marco Polo, Tradotti, ecc. da Vincenzo Lazari, Venezia, 1847, 8vo; Di due Astrolabi in caratteri Cufici occidentali trovati in

Valdagno (Veneto), Illustrazione di Almerico da Schio, Venezia, 1880, 4to; Facsimile del Planisfero di Giovanni Leardo, 1452, Illustrato da G. Berchet, Venezia, 1880, 4to; De Passagiis in Terram Sanctam, etc., edidit Georgius Martinus Thomas, Venetiis, 1879, folio; The South Sea Islanders and the Queensland Labour Trade, by William T. Wawn, London, 1893, 8vo; County Atlas of Westchester, N. Y., J. B. Beers & Co., New York, 1872, folio; History of the Settlement of Steuben Co., N. Y., by Guy H. McMaster, Bath, N. Y., 1853 (reprint, Geneva, N. Y., 1893), 8vo; A View of the Present Situation of the Western Parts of the State of New York, called the Genesee Country, Frederick-Town, 1804 (reprint, Rochester, N. Y., 1892), 8vo; Fifty Years in the Making of Australian History, by Sir Henry Parkes, London, 1892, 2 vols., 8vo; At Anchor: a Narrative of Experiences Afloat and Ashore during the Voyage of H. M. S. "Challenger," from 1872 to 1878, by John James Wild, London, 1878, folio; A New Survey of the West Indies, by Thomas Gage, London, 1677, 8vo; A History of Long Island, etc., by Nathaniel S. Prime, New York, 1845, 12mo; Voyages of a Merchant Navigator of the Days that are Past, Compiled from the Journals, etc., of Richard J. Cleveland, by H. W. S. Cleveland, New York, 1886, 12mo; Life and Labors of John Eliot, the Apostle, etc., by Robert Boodey Caverly, Lowell, Mass., 1881, 8vo; Annals and Recollections of Oneida County, by Pomeroy Jones, Rome, N. Y., 1851, 8vo; Narrative of an Explorer in Tropical South Africa, by Francis Galton, London, New York and Melbourne, 1889, 8vo; The Wit and Humour of the Persians, by Meherjibhai Nosherwanji Kuka, Bombay, 1894, 8vo; Ice-Bound on Kolguev, by Aubyn Trevor-Battye, Westminster, 1895, 8vo; A Naturalist in Mid-Africa, by G. F. Scott Elliot, London, 1896, 8vo; History of New Hampshire, by John N. McClintock, Boston, 1888, 8vo; Some Passages in the Life of an Adventurer in the Punjaub (by Sir Henry Lawrence), Delhi, 1832, 8vo; Travels in Italy, Sicily and the Lipari Islands, by R. Duppa, London, 1828, 8vo; An Account of the Life, Travels and Christian Experiences in the work of the Ministry of Samuel Bownas (J. Besse; preface), London, 1756, 8vo; The Land of Manfred, by Janet Ross, London, 1889, 8vo; Studies in a Mosque, by Stanley Lane-Poole, London and Sydney, 1893, 8vo; The Chinese, their Present and Future, by Robert Coltman, Jr., Philadelphia and London, 1891, 8vo; The Continent of America—Its Discovery and Its Baptism, by John Boyd Thacher, New York, 1896, 4to; Fire and Sword in the Sudan, by Rudolf C. Slatin Pasha, translated by Major F. R. Wingate,

London and New York, 1896, 8vo; Captain Cook's Journal during his First Voyage Round the World made in H. M. Bark "Endeavour," 1768–71, Edited by Captain W. J. L. Wharton, R. N., London, 1893, 8vo; Historia Coro-Graphica Natural y Evangelica de la Nueva Andalucia, Provincias de Cumaná, Guayana y Vertientes del Rio Orinoco, por el M. R. P. Fr. Antonio Caulin, Madrid, 1779, 4to.

BY GIFT AND EXCHANGE.

From the Société de Géographie Commerciale de la Suisse Centrale, Aarau:

Calendrier Historique Suisse, 1896.

From C. C. Adams:

Au Pays des Veddas, Ceylan, par Emile Deschamps, Paris, 1892, 8vo; The Missouri River and Its Utmost Source, by J. V. Brower, St. Paul, Minnesota, 1896, 8vo.

From the University of the State of New York, Albany:

Extension Bulletin, Nos. 9–12, 1895.

From J. H. De Bussy (Pub.), Amsterdam:

De Indische Mercuur, 19 Jaargang, 1896, Nos. 12–24.

From the Kon. Aardrijkskundig Genootschap, Amsterdam:

Tijdschrift, Deel 13, 1896, Nos. 1, 2.

From the Société d'Etudes Scientifiques d'Angers, Angers:

Bulletin, XXIV Année, 1894.

From the Naval Institute, Annapolis, Md.:

Proceedings, Vol. 22, 1896, No. 1.

From the Instituto Geographico e Historico, Bahia:

Revista Trimensal, Dezembro de 1895; Março de 1896.

From Johns Hopkins University, Baltimore, Md.:

Circulars, Nos. 124, 125, 126; Studies: Slavery and Servitude in the Colony of North Carolina, by John Spencer Bassett, Ph.D. (J. H. U.); Representation in Virginia, by Julian A. C. Chandler, A.M.

From the Naturforschende Gesellschaft, Basel:

Verhandlungen, Band XI., 1895, Heft 2.

From the Bataviaasch Genootschap, Batavia:

Notulen, etc. Deel 32, 1894, Afl. 4, Deel 33, 1895, Afl. 1, 2; Tijdschrift voor Indische Taal-, Land-en Volkenkunde, Deel 38, 1895, Afl. 4, 5; Nederlandsch-Indisch Plakaatboek 1602–1811. 13 Deel 1800–1803; Bimaneesche Texten door J. C. G. Jonker, Deel

XLVIII, 2de Stuk. (1894); Bijdrage tot de Kennis van het dialekt van Sikka, verzameld door L. F. Calon. Deel L., 1ste Stuk. (1895.)

From the University of California, Berkeley, Cal:

Register of the University 1895–96; Bulletin No. 110, Agricultural Experiment Station, The Study of Human Foods and Practical Dietetics, by M. E. Jaffa; Bulletin, Department of Geology, Vol. 1, No. 14, The Great Valley of California, a Criticism of the Theory of Isostasy, by F. Leslie Ransome.

From the Deutsche Kolonialgesellschaft, Berlin:

Deutsche Kolonialzeitung, Jahrgang 9, 1896, Nr. 12–24; Jahresbericht, 1895.

From the Gesellschaft für Erdkunde, Berlin:

Verhandlungen, Band 23, 1896, Nos. 1–3; Zeitschrift, Band 30, 1895, No. 6; Band 31, 1896, No. 1.

From the Königl. Preussische geologische Landesanstalt und Bergakademie, Berlin:

Jahrbuch für das Jahr 1894, Band XV.

From the Prussian Statistical Bureau, Berlin:

Zeitschrift, Vierteljahrsheft 1, 1896.

From the Geographische Gesellschaft, Berne:

XIV. Jahresbericht; 1895, Heft 1.

From the Société de Géographie Commerciale de Bordeaux:

Bulletin, 1896, 19e Année, Nos. 5–12.

From the American Statistical Association, Boston, Mass.:

Quarterly Publications, New Series, No. 33 (Vol. V.).

From James Brand:

The Geographical Journal, Vols. I, II, III, IV, 1893–1895, Vol. V, Parts 1–5, 1896.

From the Bureau für Bremische Statistik, Bremen:

Jahrbuch, Jahrgang 1895.

From the Geographical Society of Bremen:

Deutsche Geographische Blätter, Band XIX, 1896, Heft 1 u 2.

From the Royal Society of Queensland, Brisbane:

Proceedings, Vol. XI, Part II, 1896.

From the Brooklyn Library, Brooklyn, N. Y.:

Thirty-eighth Annual Report of the Board of Directors, March 26, 1896.

From the Société Royale Belge de Géographie, Brussels:

Bulletin, 20e Année, 1896, Nos. 1, 2.

XUM

From the City of Buenos Aires :

Monthly Return of Municipal Statistics, Jan., Feb., March, 1896; Dirección General de Estadística, El Comercio Exterior Argentino, Año 1895, Núm. 88.

From the Instituto Geográfico Argentino, Buenos Aires :

Boletin, Tomo XVI, Cuadernos 9, 10, 11 y 12; Tomo XVII, Cuadernos 1, 2 y 3, 1896.

From the Buffalo Historical Society, Buffalo, N. Y.

Annual Report of the Board of Managers for the year 1895.

From the Société Khédiviale de Géographie, Cairo:

Bulletin, IV^e^ Série, No. 7, Oct., 1895, No. 8, Fév. 1896.

From J. Capelo, Author :

La Via Central del Peru, Libro I–Coordenadas, Libro II–Documentacion Oficial, Lima, 1895–96, 12mo; Plano General del Camino Central del Perú, del Callao al Ucayali, Lima, 1895.

From the Chicago Academy of Sciences, Chicago, Ill.:

Bulletin No. 1 of the Geological and Natural History Survey, The Lichen-Flora of Chicago and Vicinity, by William Wirt Calkins.

Journal of Geology, Chicago :

Vol. IV, No. 3, Apl.–May, 1896.

From the Cincinnati Society of Natural History, Cincinnati, Ohio :

Journal, Vol. 18, Nos. 3 and 4, Oct., 1895–Jan., 1896.

From the Académie Royale des Sciences et des Lettres, Copenhagen :

Bulletin, 1895, Nos. 3, 4; 1896, Nos. 1, 2; Mémoires, 6^ème^ Série, Section des Lettres, Tome III, No. 4.

From Guido Cora, Author :

Il Territorio Contestato tra la Venezuela e la Guiana Inglese. Lettera Aperta al Chiariss. Signor Comm. Dott. Clinio Silvestri, Console Generale degli Stati Uniti di Venezuela in Italia, Torino, 1896.

From Chas. P. Daly :

Essays and Treatises on Various Subjects, by David Hume, Edinburgh, 1825, 2 vols., 8vo; Through Jungle and Desert—Travels in Eastern Africa, by William Astor Chanler, New York and London, 1896, 8vo; France and the Republic, by William Henry Hurlbert, London, 1890, 8vo; Hamburg und Umgebung (Map), Hamburg, 1895.

From the Hessian Government, Darmstadt :

Statistik des Grossherzogthums, 40 Band, 1 Heft.

From the Verein für Erdkunde, Darmstadt :
Notizblatt, Folge IV, Heft 16.

From the Colorado Scientific Society, Denver, Col.:
Some Notes on the Occurrence of Uranite in Colorado, by Richard Pearce.

From the Union Géographique du Nord de la France, Douai :
Bulletin, Trimestre 3e et 4e de 1895.

From the Royal Dublin Society, Dublin :
Transactions, Vol. V, Parts 5–12; Vol. VI, Part 1; Proceedings, Vol. VII, Parts 3, 4.

From the Royal Scottish Geographical Society, Edinburgh :
Scottish Geographical Magazine, Vol. XII, Nos. 4, 5, 6, April–June, 1896.

From the Biblioteca Nazionale Centrale di Firenze, Florence :
Bollettino delle Pubblicazioni Italiane, 5 numbers, March 31 to June 15, 1896.

From the Instituto do Ceará, Fortaleza de Ceará :
Revista Trimensal, Anno X, 1° Trimestre de 1896.

From the German Government :
Statistik des Deutschen Reichs, Vierteljahrsheft 2, 1896; Wissenschaftliche Meeresuntersuchungen von der Kommission zur wissenschaftlichen Untersuchung der deutschen Meere in Kiel, Neue Folge, Erster Band, Heft 2; Schriften des Naturwissenchaftlichen Vereins für Schleswig-Holstein, Band X, Zweites Heft, 1895.

American Antiquarian and Oriental Journal, Good Hope, Ill. :
Vol. 18, 1896, No. 2, Mar.–Apl. 3, May–June.

From the Naturforschende Gesellschaft, Görlitz, Prussia:
Abhandlungen, 21 Band, 1895.

From the Kön. Gesellschaft der Wissenschaften, Göttingen :
Nachrichten, Mathematisch-physikalische Klasse, 1896, Heft 1; Nachrichten, Philologisch-historische Klasse, 1896, Heft 1; Geschäftliche Mittheilungen, 1896, Heft 1.

From the Geographische Gesellschaft, Greifswald, Prussia:
VI Jahresbericht, 1893–96, 1 Teil.

From the Dirección General de Estadística, Guatemala :
Memoria de Estadística de la República de Guatemala, 1893.

El Progreso Nacional, Guatemala :
Año III, 1896, Nos. 195–276.

From the Koninklijk Instituut voor de Taal-Land-en Volkenkunde van Nederlandsch-Indië, The Hague:

Bijdragen, 6 Volg. 2 Deel, 2nd Aflg., 1896; Name-list of Members, 1896.

From the Nova Scotian Institute of Science, Halifax, Nova Scotia:

Proceedings and Transactions, Session of 1894–95, Vol. IX, Part 1.

From Colgate University, Hamilton, N. Y.:

Circular of Imformation, Department of Geology and Natural History, 1895–96.

From the Société Finlandaise de Géographie, Helsingfors:

Vetenskapliga Meddelanden, II, 1894–95; III, 1896.

From Abram S. Hewitt, Author:

Liberty, Learning and Property, an Address delivered by Abram S. Hewitt, LL.D., upon the Occasion of the Dedication of the new Buildings of the Columbia University in the City of New York, May 2nd, 1896.

From Levi Holbrook:

Commercial and Financial Chronicle, New York, 1893, 2 vols., 4to.

From the Ungarischer Karpathen-Verein, Igló, Hungary:

Jahrbuch, XXIII Jahrgang, 1896.

From the State Historical Society, Iowa City, Iowa:

Documentary Material relating to the History of Iowa, Nos. 3, 4; Iowa Historical Record, Vol. XII, 1896, No. 2.

From the East Siberian Branch of the Imperial Russian Geographical Society, Irkutsk:

Bulletin, Vol. XXVI, Nos. 1, 2, 3.

From the Free Public Library, Jersey City:

Library Record, Vol. 5, Nos. 1, 2, 3; Fifth Annual Report of the Trustees, Dec. 1st, 1895.

From the Society of Naturalists, Kiev:

Memoirs, Tom. XIV, No. 1.

From N. Krichtafovitch, Warsaw:

Annuaire Géologique et Minéralogique de la Russie, rédigé par N. Krichtafovitch, Vol. 1, livr. 1 (première moitié), 1896.

From the Museo de La Plata, La Plata:

Memoria presentada a la Honorable Legislatura por el Ministro de Obras Públicas, Dr. Emilio Frers, 1894–95; Mapa Catastral Gráfico de la Provincia de Corrientes, República Argentina, Construido, etc., por Zacarias Sanchez, 1893. (16 sheets.)

XUM

Kansas University Quarterly, Lawrence, Kansas:
Vol. III., Nos. 1–4, July, 1894, to April, 1895; Vol. IV., No. 3, Jan., No. 4, April, 1896.

From the Société Polonaise Géog. et Commerciale, Lemberg, Austria:
3 Publications, 1894–95.

From the Observatorio Meteorológico, Leon, Mexico:
Boletin Mensual, Marzo, Abril, Mayo de 1896.

From the Société de Géographie, Lille:
Bulletin, Tome 25, 1896, Nos. 2, 3, 4.

From the Nebraska Historical Society, Lincoln, Neb.:
Proceedings, Vol. I., No. 4, April, 1895.

From the Commissão de Cartographia, Lisbon:
Costa Oriental d'Africa-Provincia de Moçambique Reconhecimento hydrographico da Barra do Rio Licungo (M'Gondo) 1895; Provincia de Angola, Carta dos Districtos de Benguella e Mossamedes, 1895. (4 sheets.)

From the Literary and Philosophical Society, Liverpool:
Proceedings, Vols. XLIV.–XLIX., 1889–90—1894–95.

From the Liverpool Geographical Society, Liverpool:
The Ascent of Cameroons Peak and Travels in French Congo, by Miss M. H. Kingsley, paper read March 19th, 1896.

From the Meteorological Office, London:
Report of the Meteorological Council for the Year ending 31 March, 1895.

From the Royal Geographical Society, London:
The Geographical Journal, Vol. VII., Nos. 4–6, April–June, 1896.

From the Royal Society, London:
Proceedings, Vol. 59, Nos. 355, 356, 357.

From the Royal Statistical Society, London:
Journal, Vol. LIX., Part 1, March, 1896.

From the University of Lund, Sweden:
Acta Universitatis Lundensis, Tom. XXXI., 1895 (2 Parts).

From the Société de Géographie de Lyon, Lyons:
Bulletin, Tome 13, Liv. 7, Mars-Avril, 1896.

From the Sociedad Geográfica de Madrid, Madrid:
Boletin, Tomo 37, Nos. 10, 11 y 12, Oct.–Dic., 1895.

From the Geographical Society, Manchester:
Journal, Vol. XI., Nos. 4–6, April–June, 1895.

XUM

From the Literary and Philosophical Society, Manchester :
Memoirs and Proceedings, Vol. 10, 1895–96, Nos. 1, 2, 3.

From the Observatorio Meteorológico, Manila :
Boletin Mensual, Enero, Febrero de 1895.

From the Société de Géographie de Marseille, Marseilles :
Bulletin, Tome XX., 1896, Trim. 1.

From the Observatorio Astronómico Nacional de Tacubaya, Mexico :
Boletin, Tomo 1, No. 24.

From the Observatorio Meteorológico Central de Mexico, Mexico :
Boletin Mensual, 1896, Nos. 1–3.

From the Secretaria de Estado, Mexico :
Estadística Fiscal. Exportacion, Año Fiscal de 1893–94.

From the Sociedad Cientifica "Antonio Alzate," Mexico :
Memorias y Revista, Tomo IX., Nos. 1 y 2, 3 y 4, 5 y 6.

From the Società de Esplorazione Commerciale in Africa, Milan :
L'Esplorazione Commerciale, Anno XI., 1896, Fasc. V., VI.

L'Universo, Geografia per Tutti, Milan :
Anno VI., 1896, Nos. 5–10.

From the Prince Albert de Monaco, Author :
Sur la Deuxième Campagne Scientifique de la "Princesse Alice" (Paris), 1895, 4to.

From the Academy of Natural Sciences, Geographical Section, Moscow :
Geography (bulletin), Part 1, 1896.

From the State Board of Health, Nashville, Tenn.:
Bulletins, April, May, June, 1896.

From the Société Neuchateloise de Géographie, Neuchatel :
Bulletin, Tome VIII, 1894–95.

From the Tyneside Geographical Society, Newcastle-on-Tyne :
Journal, Vol. III, No. 4, May, 1896.

From Yale University, New Haven, Conn. :
Report of the President of Yale University for the year ending Dec. 31, 1895.

From the Geological Survey of New Jersey :
Annual Report of the State Geologist for 1895.

From the American Museum of Natural History, New York :
Annual Report of the President, etc., for the Year 1895.

From the Bronx Valley Sewer Commission, 16 Exchange Place, New York :
Report of the Bronx Valley Sewer Commission, 1896.

From the Chamber of Commerce, New York :

Thirty-eighth Annual Report of the Corporation of the Chamber of Commerce of the State of New York, for the year 1895–'96.

From the Engineers' Club, New York :

Constitution, Rules, Officers and Members of the Engineers' Club, New York, 1896, small 8vo.

From the General Society of Mechanics and Tradesmen, New York :

One Hundred and Tenth Annual Report, 1895 (2 copies).

From the Military Service Institution, Governor's Island, New York :

Journal, Vol. 18, 1896, May.

From the New York Institution for the Instruction of the Deaf and Dumb :

Seventy-seventh Annual Report to the Legislature of the State of New York, for the Year 1895 (2 copies).

From the New York University :

Catalogue for 1895–96. Announcements for 1896–97.

From the North Side Board of Trade, New York :

Address of Mr. Fordham Morris, Delivered at the Banquet in the Pavilion at Oak Point at the Opening of the Harlem Ship Canal, June 17, 1895. Pamphlet No. III. Second Annual Report of the Secretary of the North Side Board of Trade of the City of New York, March 6, 1896. Pamphlet No. IV.

From Oberlin College, Oberlin, Ohio :

Catalogues, 1888–89, 1889–90, 1890–91, 1891–92, 1892–93, 1893–94, 1895–96; Quinquennial Catalogue, 1895; Bulletins, Nos. 5, 6, 7, 8; Occasional Bulletin No. 1, How to use the Library, by Etta M. Wright; Preliminary List of the Flowering and Fern Plants of Lorain County, Ohio, 1889; Laboratory Bulletin No. 1. Supplement, Additions to the Preliminary List of the Flowering and Fern Plants of Lorain County, 1893; Papers of the Ohio Church History Society, Vols. I–VI, 1890–95.

From the Société de Géographie et d'Archéologie de la Province d'Oran, Oran, Algeria :

L'Heure Décimale et la division de la Circonférence. Henri de Sarrauton.

From the Department of Marine and Fisheries, Ottawa :

Survey of Tides and Currents in Canadian Waters, Report, 13th April, 1896.

From the Compagnie Universelle du Canal Maritime de Suez, Paris :

Le Canal de Suez, Bulletin Décadaire, 1896, Mars 22–Juin 3.

From Hachette et Cie, Paris :

Le Tour du Monde, 1896, Livraisons 13–25.

From the Société de Géographie Commerciale, Paris :

Bulletin, Tome XVIII, 1896, Fasc. 3, 4, 5.

From the Société de Géographie, Paris :

Comptes Rendus, 1896, Nos. 3 et 4, 5, 6 et 7, 8 et 9.

From the Société de Spéléologie, Paris :

Spelunca, Bulletin, No. 4, Oct.–Déc., 1895, No. 5, Jan.–Mars, 1896; Mémoires de la Société, No. 1, 2, 1896.

From the Société de Topographie, Paris :

Bulletin, 19e Année, 1895, Nos. 10, 11, 12; 20e Année, 1896, Nos. 1, 2, 3.

From the Academy of Natural Sciences, Philadelphia, Penn. :

Proceedings, Part 1, 1896.

From the Franklin Institute, Philadelphia, Penn. :

Journal, Vol. 141, 1896, Nos. 5, 6.

From the Geological Survey of Pennsylvania, Philadelphia :

Summary Description of the Geology of Pennsylvania, Final Report, 1895, Vol. III, Parts 1, 2; General Index of the Final Summary Report; Atlas to Accompany Report F—3. (6 sheets in case.)

From the Czech Geographical Society, Prague :

Sborník, Vol. II, No. 3.

From the Observatorio do Rio de Janeiro, Rio de Janeiro :

Annuario, 1896.

From Chandler Robbins :

The Partition of Africa, by J. Scott Keltie, London, 1893, 8vo; Diary of an Idle Woman in Constantinople, by Frances Elliot, New York, 1893, 8vo; A Florida Sketch-Book, by Bradford Torrey, Boston, 1894, 8vo; The Campaign of Waterloo, by John Codman Ropes, New York, 1892, 8vo, and Atlas, 1893, 4to; The Pamirs, by the Earl of Dunmore, London, 1893, 2 vols. 8vo.

From the Société de Géographie de Rochefort, Rochefort :

Bulletin, Tome XVII, 1895, Nos. 3, 4.

From the Instituto Cartográfico Italiano, Rome :

Carta del Teatro della Guerra nel Sudan Egiziano, tratta dalle migliori e piu recenti carte militari inglesi per cura dell Istituto. Scala 1 : 2,000,000.

From the Ministero degli Affari Esteri, Rome :

Bollettino, 1896, Nos. 75–80.

From the Ministero di Agricoltura, Industria e Commercio, Rome:

Cause di Morte. Statistica degli anni 1893 e 1894; Annali di Statistica, Fasc. LX, Notizie sulle condizioni industriali della Provincia di Girgenti.

From the Ministero delle Poste e dei Telegrafi, Rome:

Relazione Statistica intorno ai Servizi Postale e Telegrafico, 1894–95 ed al Servizio delle Casse Postali di Risparmio per l'anno 1894.

Rivista Geografica Italiana, Rome:

Annata 3, 1896, Fasc. II–III, IV.

From the Società Geografica Italiana, Rome:

Bollettino Vol. IX, 1896, Fasc. III.–VI.; Memorie della Società, Volume V, Parte Prima, Parte Seconda, 1895–96.

From the Société Normande de Géographie, Rouen:

Bulletin (17e Année), 1895, Sept.–Oct., Nov.–Déc.; (18e Année), 1896, Jan.–Fév.

From the Société de Géographie Commerciale, St. Nazaire, France:

Bulletin XII, 1895.

From the Imperial Russian Geographical Society, St. Petersburg:

Bulletin, Vol. 31, Nos. 4, 5, 6; Memoirs, Vol. XXVII, Description of Astrakhan District,—Climate; Geography of Western China, Vol. 1, Along the Eastern Tian Shan; The Tubetski Expedition 1889–1890, Part I; Astronomical and Magnetic Observations at the Mouth of the Lena, 1882–1884.

From the California Academy of Sciences, San Francisco, Cal.:

Proceedings, Second Series, Vol. V, Part 2.

From the Geographical Society of the Pacific, San Francisco, Cal.:

An Examination into the Genuineness of the "Jeannette" Relics. Some Evidences of Currents in the Polar Regions. Report of the Special Committee, May, 1896.

From the Sierra Club, San Francisco, Cal.:

Bulletin, Vol. I, No. 8, May, 1896; Map of the Central Portion of the Sierra Nevada Mountains and the Yosemite Valley.

La Gaceta, San José, Costa Rica:

Diario Oficial, 1896, Núms. 62–135.

From the Instituto Físico-Geográfico Nacional de Costa Rica, San José, Costa Rica:

Anales, Tomo VI, 1893.

From the Historical Society of New Mexico, Santa Fé, N. M.:

The Stone Idols of New Mexico. A Description of those belonging to the Historical Society.

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From the Inspectorate General of Customs, Shanghai :

Special Series, Medical Reports, for the year ending 30th Sept., 1895; List of Chinese Lighthouses, Light Vessels, Buoys and Beacons for 1896.

From the Bureau de Statistique de la Principauté de Bulgarie, Sophia, Bulgaria :

Mouvement Commercial de la Bulgarie avec les Pays Etrangers, etc., pendant Décembre, 1895, et Janvier, 1896; Statistique du Mouvement de la Navigation pendant les années 1891–94.

From the Swedish Government, Stockholm :

5 Statistical Documents.

From the Geological Survey of New South Wales, Sydney, N. S. W.:

Records, Vol. IV, Index; Vol. V, Part I, 1896.

From the Linnean Society of New South Wales, Sydney, N. S. W.:

Proceedings, Second Series, Vol. X, Nov. 1894—March, 1895.

From the Canadian Institute, Toronto:

Transactions, Vol. IV., Part 2, No. 8, Dec. 1892; Archæological Report, 1894–95, by David Boyle. Appendix to the Report of the Minister of Education, Ontario (1896); The Functions of a Great University, Inaugural Address, Nov. 16, 1894, by J. M. Clark.

From the Académie de Toulouse, Toulouse:

Annuaire de l'Université (1895–1896); Rapport Annuel du Conseil Général des Facultés (17 Jan. 1896).

From the Société de Géographie de Toulouse, Toulouse:

Bulletin, 14e Année, 1895, Nos. 9 et 10.

From the Société de Géographie de Tours, Tours :

Revue, 13e Année, 1896, No. 1.

From the Geographische Gesellschaft, Vienna :

Mittheilungen, Vol. 39, 1896, Nos. 2 u 3.

From the Geological Institute, Vienna :

Verhandlungen, 1896, Nos. 1–5.

From the American Historical Association, Washington :

Annual Report for the year 1894; Officers, Act of Incorporation, Constitution, List of Members, Historical Societies in the United States, 1896.

From the Anthropological Society, Washington :

The American Anthropologist, Vol. IX., Nos. 4, 5, 6.

From the Bureau of American Republics, Washington:

Monthly Bulletin for March, April and May, 1896; Index to Vol. I., Oct., '93, to June, '94; Index to Vol. II., July, '94, to June, '95.

From the U. S. Coast and Geodetic Survey, Washington:

Bulletin No. 35, Alaska, General Information, etc., 1896; Report of the Superintendent for the year ending June, 1894, in 2 parts.

From the U. S. Fish Commission, Washington:

Bulletin, Vol. XV. for 1895.

From the U. S. Geological Survey, Washington:

Topographical Atlas, California, San Francisco sheet; Colorado, Aspen sheet—Cripple Creek special map; Florida, Citra sheet—(Marion Co.) Ocala sheet—Panastoffkes sheet—Tsala sheet—Williston sheet; Louisiana (St. Bernard Parish) Bodreau sheet; Maryland–Virginia, Nomini sheet; Michigan, Ned Lake sheet—Perch Lake sheet; Minnesota (St. Louis Co.), Duluth sheet; New Hampshire, Crawford Notch sheet; New York, Amsterdam sheet—Chittenango sheet—Oneida sheet—Oriskany sheet; New York-Vermont, Fort Ann sheet—Whitehall sheet—Willsboro sheet (Plattsburg); North Carolina, Hickory sheet; Oklahoma, Kingfisher sheet; South Dakota, Aberdeen Sheet—Byron Sheet; Tennessee, Wartburg sheet; Texas, Alpine sheet—Chispa sheet—Marfa sheet—Sherwood sheet—(El Paso Co.) Sierra Blanca sheet—Wartburg sheet; Virginia-West Virginia, Tazewell sheet; Wyoming, Crandall Creek sheet—Dayton sheet—Ishawooa sheet—(Albany Co.) Laramie sheet.

From the U. S. Hydrographic Office, Washington:

Charts: No. 1468, U. S., Ohio, Lake Erie, Cleveland Harbor and Approaches; No. 1470, N. America, Canada, Lake Huron, Georgian Bay, French River to Little Current and Cabot Head; No. 1478, N. America, Canada, Ontario, Lake Erie, Kingsville Harbor; No. 1479, N. America, Canada, Lake Huron, Goderich Harbor; No. 1531, The Arctic Regions with the Tracks of Search Parties and the Progress of Discovery (2 sheets); No. 1532, Japan, Inland Sea, Suwo Nada, Himeshima Roads; No. 1533, Distances in statute miles between places on the Great Lakes; No. 1534, Japan, Inland Sea, Bingo Nada, Tomo Tsu; No. 1535, Japan, S. Coast of Shikoku, Susaki Minato and Nomi Ura; No. 1536, U. S. and Canada, St. Mary's River, Mud Lake Channels; No. 1537, Island of Haiti, Republic of Santo Domingo, San Pedro de Macoris; No. 1538, S. America, W. Coast of Peru, Lobos de

Afuera; No. 1539, S. America, W. Coast of Peru, Lobos de Tierra; No. 1540, S. America, Anchorages on the W. Coast of Colombia.—Pilot Charts: North Atlantic Ocean, April, May and June, 1896; North Pacific Ocean, May, June and July, 1896.—H. O. Publications, No. III, Sunrise and Sunset Tables, etc.

From the Department of the Interior, Washington:

Report on the Statistics of Agriculture in the United States at the 11th Census, 1890; Report on Transportation Business in the United States at the 11th Census, Part I., Transportation by Land; Report on Vital and Social Statistics in the United States at the 11th Census, Part III., Statistics of Deaths; Abstract of the Eleventh Census of the United States, Second Edition; Report on Manufacturing Industries of the United States at the 11th Census, Parts I. and II.

From the National Geographic Society, Washington:

National Geographic Magazine, Vol. VII., 1896, Nos. 4, 5, 6.

From the Smithsonian Institution, Washington:

Thirteenth Annual Report of the Bureau of Ethnology, 1891–92.

From the Department of State, Washington:

Consular Reports, 185, 186, 187, 188, 189; List of Books, Pamphlets and Maps received at the Library of the Department of State, July–December, 1895.

From the Weather Bureau, Washington:

Monthly Weather Review, November and December, 1895.

From Joseph Wiener, M.D.:

The Modern Traveller. A Popular Description, Geographical, Historical and Topographical of the Various Countries of the Globe, London, 1824–1831, 30 vols. 12mo.

From the American Antiquarian Society, Worcester, Mass.:

Proceedings at the Annual Meeting held in Worcester, Oct. 23, 1895, Vol. X., Part 2.

From the Worcester Society of Antiquity, Worcester, Mass.:

No. XLIII. (Part 2 of Vol. XII.) Worcester Births, Marriages and Deaths, Part II., Marriages.

From the Yorkshire Philosophical Society, York:

Annual Report of the Council for 1895.

TRANSACTIONS OF THE SOCIETY.

APRIL, 1896.

A Regular Meeting of the Society was held at Chickering Hall, on Monday, April 13, 1896, at 8.30 o'clock, P.M.

President Daly in the chair.

The following persons, recommended by the Council, were elected Fellows of the Society:

Mrs. Geo. F. Canfield. R. E. Dodge.

The President then introduced the speaker of the evening, Dr. A. Donaldson Smith, who addressed the Society on the First Expedition through Somaliland to Lake Rudolf.

On motion, the Society adjourned.

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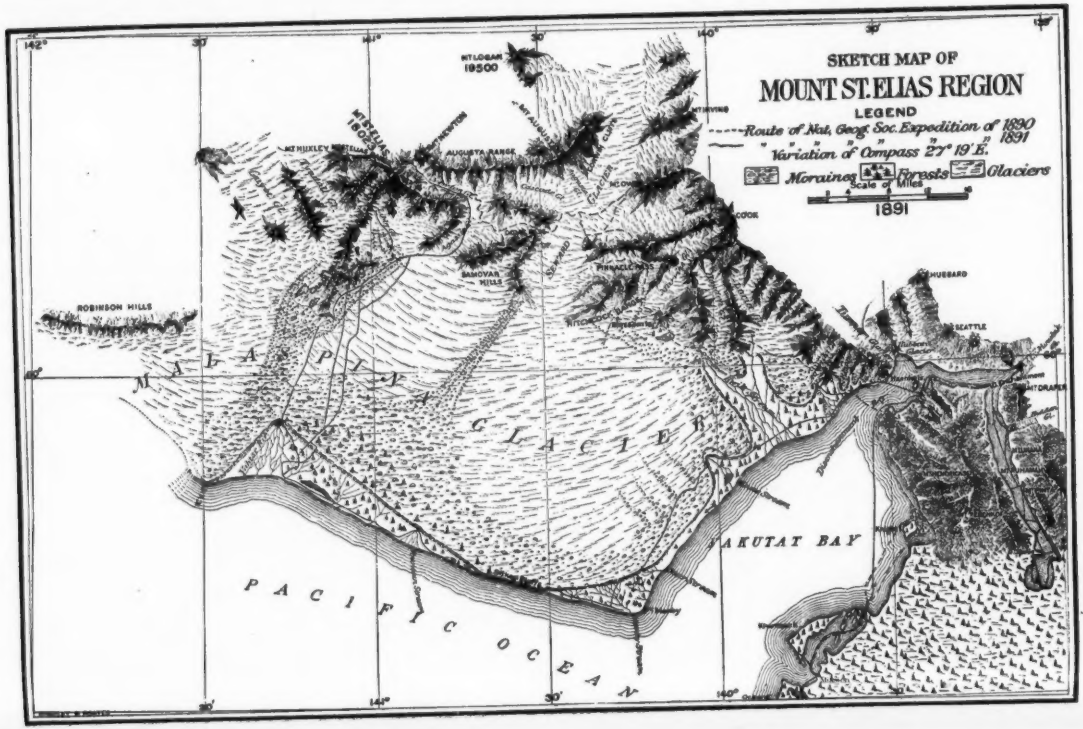
SKETCH MAP OF
MOUNT ST. ELIAS REGION
LEGEND
Route of Nat. Geogl. Soc. Expedition of 1890
" " " " 1891
Variation of Compass 27° 19' E.
Moraines
Forests
Glaciers
Scale of Miles
1891
MT LOGAN 19500
MT HUXLEY 18000
MT IRVING
MT VANCOUVER
AUGUSTA RANGE
NEW ARGAND
COOK
PINNACLE PEAK
SAMOVAR HILLS
ROBINSON HILLS
HUBBARD
SEATTLE
MALASPINA GLACIER
YAKUTAT BAY
PACIFIC OCEAN